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THE UNIVERSITY OF ALBERTA

AN INVESTIGATION OF PERSONALITY AND COGNITIVE CORRELATES  
OF RELIGIOUS DEVOUTNESS

by

Joseph William Quinn

A Thesis

Submitted to the Faculty of Graduate Studies

In Partial Fulfillment of the Requirements for the Degree of  
Doctor of Philosophy

Department of Educational Psychology

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UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "An Investigation of Personality and Cognitive Correlates of Religious Devoutness," submitted by Joseph William Quinn in partial fulfillment of the requirements for the degree Doctor of Philosophy.

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## ABSTRACT

This dissertation was designed to investigate whether intra-denominational religious devoutness is significantly related to measures of dogmatism, critical thinking, aesthetic interest and need Achievement. These variables have been shown to be related to religious devoutness and denominationalism in a host of studies.

The nature of the relationships between devoutness and the selected variables was specified according to expectations derived from traditional, i.e., Weberian, theorizing. The directionality of the relationships among the dependent variables was specified by the theoretical framework provided by Harvey, Hunt and Schroder.

Five hypotheses were tested; four pertained to the relationships between devoutness and the dependent variables, one pertained to the relationships among the dependent variables irrespective of devoutness.

Multiple linear regression models, designed so they were analagous to analyses of covariance where sex, ethnicity, intelligence and socio-economic status were permitted to absorb criterion variance, were used to test the four hypotheses concerning the dependent variables' relationships to devoutness. Factor analysis was used to reach a decision on the relationships among the dependent variables.

The results indicated that devoutness bears non linear relationships to dogmatism, critical thinking and aesthetic interest and a linear relationship to need Achievement. All of these relationships were significant except for the devoutness-aesthetic interest relationship. The directionality of the relationships among the four dependent variables was correctly





specified except for aesthetic interest; this variable related to the other three in the direction opposite to that hypothesized.

The general conclusion to be derived from this study is that devoutness does not relate to these variables in as simple a manner as some social scientists propose. There is some evidence that need Achievement scores do relate to devoutness as hypothesized. However, in view of the fact that a large sample was employed, the writer cautions that alpha error probabilities should be very small since the test power is high. Alpha error probabilities were increased in this report to permit inspection of relationships. This factor should be carefully entertained before any conclusions are drawn from this study; results which are statistically significant may be of marginal utility in application.





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## CHAPTER I

### INTRODUCTION

The relationship between religious belief and variables such as authoritarianism, need achievement, neuroticism, worldmindedness, and academic and vocational achievement has been the object of a multitude of scientific studies, e.g., McClelland (1961), Rokeach (1960), Zentner (1964b), Cheal (1963), Garrison (1962), Mayer and Sharp (1962).

Probably the most significant finding of these studies and others is that the psychologist and sociologist is still groping for a precise explanation of the role that religious belief plays in determining response on the cognitive, motivational and personality measures mentioned above. The trichotomization of believers as Jewish, Protestant and Catholic has contributed to results which have helped consolidate the hierarchical stereotype of these three groups as being in a descending order insofar as possession of psychologically desirable traits is concerned.

A cursory inspection of the existing literature indicates that many researchers have limited themselves to bivariate studies. This is because the hypothesis could be satisfactorily tested by a two variable analysis or perhaps more frequently because multivariate analyses required laborious calculations which are sometimes inefficient without the use of a computer. The disadvantage of the bivariate study is that misinterpretation can and does occur, e.g. Cheal (1962), while inferring a causal relationship from a simple correlation coefficient, generalized from a





denominationalism-productivity correlation before partialling out expenditure of resources involved in productivity. (Robinson, 1962)

The present writer intends to report a study which was multivariate in nature; it is his opinion that more valid conclusions can be drawn from this type of analysis. Preceding the explanation of the study itself is a brief overview of the previous research and a more detailed report on several studies which have investigated the relationship between religious belief and need achievement, dogmatism, critical thinking and aesthetic values preference.





## CHAPTER II

### RELEVANT RESEARCH

#### Development of Theory

The research which appears to form the solid core of the psychological theory concerning the influence of religiosity and denominationalism on various psychological variables was done by Tawney (1922), Weber (1950), McClelland (1961) and Rokeach (1960). A definite support for the theoretical framework woven by Tawney and Weber has been given by the experimental findings of McClelland and Rokeach.

Tawney and Weber proposed that the Reformation had effects which went far beyond the mere institution of new religious groups. Essentially, they hypothesized that Protestantism and capitalism are more compatible than Catholicism and capitalism. Tawney traced the historical events related to this proposal while Weber concentrated more on the psychological influences of Protestantism and Catholicism insofar as they relate to business and worldmindedness.

Weber (1950) developed the theory of the Protestant ethic which states that the psychological compatibility of religious and worldly goals is more obvious to the Protestant than to the Catholic. He proposed that Protestantism and capitalism are not only compatible, but also that the average Protestant perceives success in the business world as a means of attaining religious objectives as well. On the other hand Catholics are more likely to perceive a sharp cleavage between religious and worldly objectives and consequently, as a group, do not aspire to, or





reach, the levels of achievement in business that Protestants attain. To generalize one step from the theory, one can also hypothesize that non-believers are more worldminded than believers.

### Achievement Motivation

McClelland (1955), when interpreting Winterbottom's (1953) findings, noted the striking similarity between his own ideas concerning people high in achievement motivation and Weber's notion of the Protestant ethic. The common element which bridged both theories was delineated by Winterbottom, viz. independence training of boys by the mother.

McClelland writes:

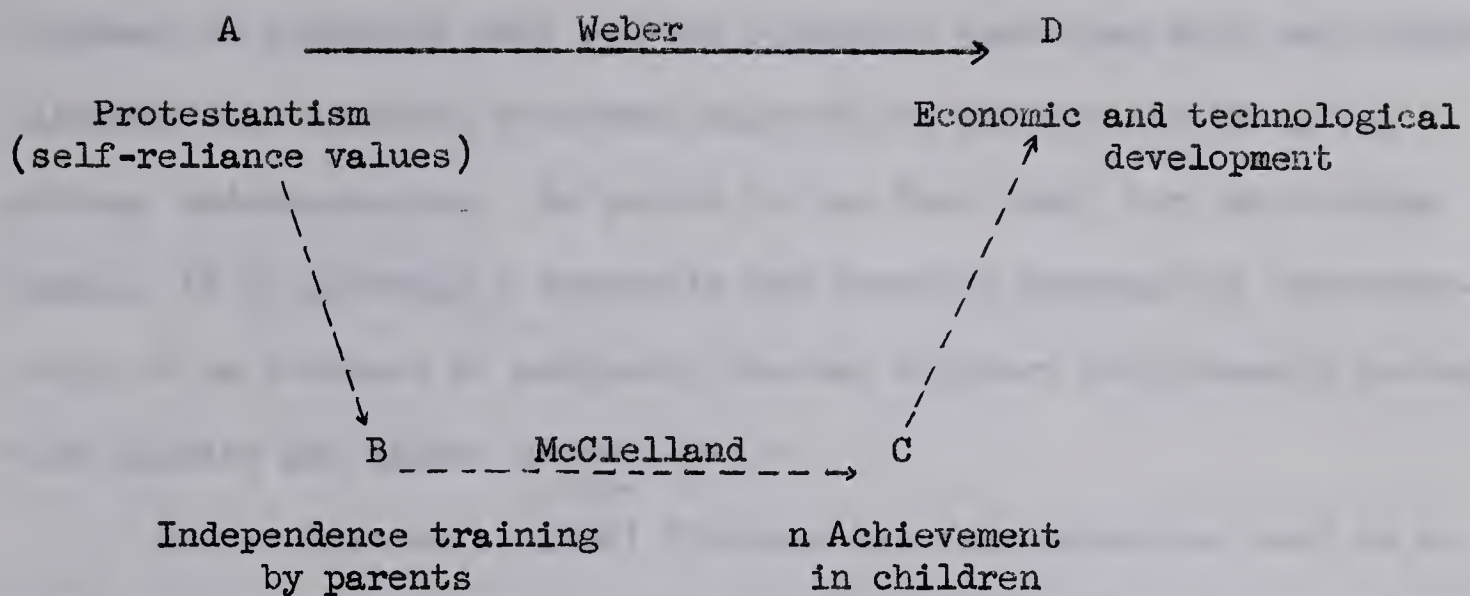
Considered in a social and historical context, this linkage suggested an interesting parallel with Weber's classic description of the nature and characterological consequences of the Protestant Reformation. In the first place, he stresses, as others have, that the essence of the Protestant revolt against the Catholic Church was a shift from a reliance on an institution to a greater reliance on the self, so far as salvation was concerned. The individual Protestant Lutheran or Calvinist was less dependent on the church as an institution either for its priests or its sacraments or its official dogma . . .

. . . As Weber describes it, we have here what seems to be an example of a revolution in ideas which should increase the need for independence training . . . In the second place, Weber's description of the kind of personality type which the Protestant Reformation produced is startlingly similar to the picture we would draw of a person with high achievement motivation . . . Weber feels that such a man "gets nothing out of his wealth for himself, except the irrational sense of having done his job well." This is exactly how we define the achievement motive. (pp. 43-44)

McClelland then proposed that the key factor differentiating between Protestants and Catholics was childhood independence training which is represented by the broken line in the diagram below.







Essentially, the above discussion outlines McClelland's role in clarifying the relationship between religiosity and achievement. His assertion that Protestants are higher in achievement motivation and world-mindedness has formed the basis for much subsequent research, e.g., Cheal (1960), Zentner (1964), Garrison (1961), Mayer and Sharp (1962), Veroff et al. (1962). The evidence does not give unanimous support to the theory although there is a general trend toward supportive findings.

#### The authoritarian personality syndrome

Rokeach (1960) has investigated the relationships between those personality traits, which, as a cluster, are often used to define the authoritarian personality. Unfortunately there has been a tendency to overgeneralize in this context and one gradually gets the impression that there are those who consider authoritarianism, ethnocentrism, intolerance of ambiguity, closed mindedness, cognitive rigidity, prejudice and conformity to be, for all practical purposes, synonyms. Davids (1964) underscores this fallacy and cautions against inaccurate interpretations of findings. In his study Davids found that Navy personnel, though less



tolerant of ambiguity than college students, were also much less anxious, alienated and neurotic than were many of the subjects in the group of college undergraduates. He points to the fact that, for the college sample, it is probably a desirable and rewarded personality characteristic to be tolerant of ambiguity whereas military requirements necessitate clarity and direct communication.

One of Rokeach's (1960) findings was that Catholics tend to be more dogmatic than Protestants. Adorno et al. (1950) who have not only isolated the area for study, but have also done a tremendous amount of supportive research, relate the authoritarian personality to child-rearing practices. From a neo-psychoanalytic orientation, they explain that too severe or too early toilet training for a child who has not yet acquired language, leads to fear of any situation that is unclear or ambiguous. Because he has been rewarded for being dry when he didn't know why he was being rewarded, and punished for being wet when not cognisant of why he was punished, the child expects unknown and very possibly unpleasant things to happen to him whenever he is in an unclear situation; he is intolerant of ambiguity (McCandless, 1961). He attempts to reduce the anxiety engendered by ambiguity by forcing things into rigid molds and clear classifications.

The important point here is that a link has been found between religiosity and traits usually associated with the authoritarian syndrome. Catholics, who belong to a church whose authority is hierarchically and ultimately, infallibly constituted, are said to be more prone to the development of authoritarian traits. The question which has not yet been







satisfactorily answered is whether the linkage is caused by religious beliefs alone or by other variables, mainly ecological ones.

### Summary of basic theory

1. Weber and Tawney have provided the theoretical formulations which link Protestantism and economic achievement. Weber views Catholics as unable to compete as successfully as Protestants in worldly affairs because their religious beliefs are incompatible with competitive capitalist objectives.

2. McClelland posits early independence training as a key variable in developing a high need for achievement in children. He sees this training to be more prominent in Protestant homes than in Catholic homes and draws the logical conclusion.

3. Rokeach, drawing from the volumes of literature on what has been herein called the authoritarian syndrome, has linked Catholicism and closed mindedness. Since he also links the many traits generally subsumed under the concept of authoritarianism, the implication is that Catholics in particular, and believers in general, are a group of people with psychologically undesirable characteristics.

Having established the basic orientation which seems to permeate most social and psychological research in this area, the writer will endeavour to present a more comprehensive outline of findings of studies designed to measure the relationship between religious belief and need Achievement, dogmatism, critical thinking and interest in the aesthetic.



## CHAPTER III

### FOUR SPECIFIC VARIABLES AND RELIGIOSITY

#### Achievement, n Achievement, Worldmindedness and Values

One of the most salient studies which has been done to test McClelland's (1955) theory is that of Mayer and Sharp (1962). In their analysis of the achievement of Detroit adults, groups of subjects categorized according to denomination were equated on the ascribed factors of (a) rural - urban background, (b) foreign - native background and (c) extent of experience in metropolitan Detroit. Then the groups were compared to note differences on the achieved factors of:

1. Family income, i.e., the percentage in each group who earned \$2000. or more above the Detroit median income.
2. Percentage self-employed.
3. Percentage holding white collar jobs.
4. Median school year completed.
5. Percentage of members belonging to three or more formal social groups.

A summary score for each group on achieved and ascribed factors was then calculated and the difference interpreted as an index of worldly achievement. The groups, ranked from high to low achievement appeared as follows:

1. Jewish
2. Eastern Orthodox
3. Semi-Christian





4. Episcopalian
5. Calvinist
6. Protestant (No denomination)
7. Methodist
8. Small sects
9. Lutheran
10. Baptist
11. Catholic

The authors state that the findings clearly support Weber's hypothesis of the Protestant ethic. This writer's main criticism of the study is that on the ascribed factor of foreign - native background, only 36% of the Catholic group reported having native born fathers. Although one cannot be certain that this is an extremely important point, it is reasonable to assume that language and social barriers may have played a crucial role in determining the results, especially since no other group reported such a high percentage of foreign born fathers. At any rate, the study is here presented as an example of a conscientious effort cited in support of the Weberian theory of Protestant superiority in economic and business affairs.

McClelland (1955, 1961), has produced results which support his theory. In his analysis of the denominationalism - economic advancement relationship, he has consulted statistics on consumption of electricity in kilowatt hours. His findings seem to clearly indicate that predominantly Protestant countries use significantly more electricity than predominantly Catholic countries. He draws the obvious conclusion, relating



Protestantism to technological development.

In his study of Catholicism and intellectualism in the United States, O'Dea (1958) paints a rather bleak picture insofar as Catholic intellectual activity is concerned. An excerpt will serve to illustrate the point:

. . . Catholics go to college less frequently than do Jews and Protestants and upon graduation tend to earn lower salaries and to occupy more humble positions . . . The 35,000,000 Catholics in this country and our Catholic educational system are not producing anywhere near their proportion of leaders. It has been possible for a Catholic sociologist to speak of "the almost complete failure of American lay Catholics to distinguish themselves in terms of scholarship." The Catholic World, for January, 1958, declared that "The limitations of Catholic schools are revealed each time the National Science Foundation Fellowship Awards are distributed. In 1956 the Foundation gave out 775 fellowships; only seventeen went to students in Catholic colleges. In 1957 the Foundation gave out 845 fellowships; only nineteen went to students in Catholic colleges." (pp. 19-20)

In his conclusions, O'Dea offers four basic characteristics of the American Catholic environment which inhibit the development of mature intellectual activity. These are:

1. Formalism, which pre-empts any search, experience or . . . scientific approaches to problem solving. Creative thought is inhibited.
2. Authoritarianism, whereby Catholics learn to obey authority and become overly conforming.
3. Clericalism, or the tendency for Catholics to give the priest role a monopoly with respect to intellectual activities.
4. Moralism, or the tendency for Catholics to view the world and secular goals as sources of evil and sin. This is where Weber







sees the basic incompatibility between Catholicism and capitalism.

One extremely important qualification must be added here. O'Dea does not overlook the socioeconomic variable; as a matter of fact, he sees the interaction of socioeconomic status and the factors mentioned above as the key to Catholic non-intellectualism. He states:

Upper and upper middle class families provide about 10 per cent of the children in the United States but send 80 per cent to college. The lower middle class produces about 30 per cent of American children but sends only 25 per cent of them to college. Classes below this provide 60 per cent of the children but educate only 5 per cent of them in college. Catholics appear to belong mainly to the lower middle and lower class. This has two meanings; they belong to those classes which produce the largest number of children and which provide them with college education to the least extent. (p. 120)

Since Catholics, as a group, are poorer than Protestants and Jews, the social class - intelligence relationship is a relevant one. Cropley (1963), Elley (1961), McCandless (1961) as well as a host of others have provided rather conclusive proof that lower class children do not perform as well as higher class children on conventional intelligence tests. Furthermore, McCandless stresses that the lower class child is further handicapped by his inadequate lower class values system which is characterized by a more concrete, present - oriented set of values than that of his middle and upper class equivalent.

Cheal (1962) has found evidence to suggest that Canadian Catholic schools are not reaching their full potential. He has been criticized by Robinson (1962) for his scientific interpretation of data, but a later piece of work (1963) clarifies his earlier conclusion. Zentner (1964), using Cheal's data on Alberta school children, offers a psycho-socio-





logical explanation for the poorer performance of Catholic children. He stresses the religious socialization - social class interaction as the key factor. It is rather unfortunate that he did not make a more careful study of the urban - rural variable; Cheal's data suggest that differences among urban children aren't nearly as marked as among rural children. Rhodes (1960) found this variable to be salient when studying authoritarianism and fundamentalism.

One study which reports contradictory findings in the area of achievement motivation is that of Veroff et al. (1962). In a previous study these writers found that Catholic men had higher need achievement than Protestant men. The report referred to here represents an attempt to fit the results of a previous study into the theories permeated by Weber's notion of the Protestant ethic. The empirical findings were as follows:

	<u>Number</u>	<u>Per cent scoring High n Achievement</u>
Protestant	366	48
Catholic	121	57
Jewish	75	68

The high percentage of Catholic men who scored high on n Achievement represents a problem for the researchers. They resolved the contradiction by examining age group differences; it was found that middle aged Catholic men scored significantly higher than middle aged Protestant men. This, say the writers, is due to the fact that middle aged Catholic men are more achievement conscious because they must provide for their numerous offspring. The inconsistency of these results with





previous findings is interpreted in terms of the high economic status and restricted geographical locale of the population from which previous samples were drawn.

Garrison (1961, 1962), using college students as subjects, has found that the relationship between worldmindedness and denominationalism is fairly clear. It would appear that church groups (which he defines as society accepting) are more worldminded than sects (which he defines as society rejecting). The order of worldmindedness which he found is as follows:

- Jewish
- Episcopalian
- Lutheran
- Protestant (no denomination)
- Catholic
- Presbyterian
- Methodist
- Baptist
- Miscellaneous sect groups

He also found positive correlations between grade points in educational psychology (.26), freedom from misconception about human nature (.36), worldmindedness (.51) and church (society accepting) typology scores.

Spoerl (1961), using a large sample ( $N = 1077$ ) of Unitarian - Universalist youth from all sections of the country, found a consistent "liberal pattern" high on theoretical, aesthetic, and social values and low on religious values. These findings provide support for the Protestant ethic and acquire even more significance in the light of Blatt's (1961) and Blatt and Stein's (1959) conclusions concerning efficient problem solvers. The latter authors delineate a preference for aesthetic values as the pervasive characteristic of efficient problem solvers in their



studies. They describe the successful problem solvers as those who become part of the problem and seek the solution from within rather than those who apply previously learned principles for solution, i.e., try to fit the problem to a particular problem solving strategy.

### The authoritarian syndrome

It is generally assumed that the authoritarian personality is rigid, or inflexible; that it is concrete in its thinking and does not handle abstractions easily; that it is conforming and does not willingly examine its own thoughts and adjustment. There is also an exaggerated respect for authority and emphasis on masculinity or femininity; there is hostility (prejudice) toward groups other than the one to which the authoritarian individual belongs. There is a preference for absolutes and an intolerance of ambiguity.

It is highly probable that in a free association experiment where the subject is a psychologist, the stimulus words "authoritarian personality" would elicit a series of associations containing references to prejudice, conformity, intolerance of ambiguity, rigidity, ethnocentricity, hostility, etc. This is an understandable and tenable position since research has supported the notion that the listed hypothetical associations are really related to authoritarianism, i.e., these are valid associations to make.

The F (fascism) Scale developed by Adorno et al. (1950) is the most commonly used instrument for measuring authoritarianism. The scale has been widely criticized, e.g., Zuckerman, et al. (1958), Christie et







al. (1958), because it does not differentiate between acquiescent and authoritarian personalities. However, as previously suggested, conformity or acquiescence may be a component of what we call authoritarianism; Crutchfield (1955), using a sample of 50 men who averaged 34 years of age, and all of whom were engaged in occupations where leadership qualities were important, found a correlation of  $+0.39$  between F-scale score and conformity. Nadler (1959) performed a similar study to replicate Crutchfield's. He used 70 college students as subjects and found an even more significant correlation of  $+0.48$  between F-scale score and tendency to yield. In view of the fact that Wells et al. (1956) found a similar relationship ( $p < .001$ ), it is reasonable to state with a high degree of confidence that authoritarianism and conformity are related. In other words, as McCandless (1961, p. 366) states:

The F-scale, mainly because of its structure, seems to be measuring two things that, although correlated, are different from each other. This confuses the results that have been obtained from it.

. . . Most investigators working with the F-scale have ignored such subtleties, and have proceeded on the assumption that those scoring high on the scale were authoritarian; those scoring low, equalitarian.

Whether the F-scale yields an accurate index of authoritarianism or a more complex measure of authoritarianism confounded by conformity is not the key issue here. Rather, we are more concerned with whether or not differences in "F-ness" are related to religious devoutness.

Young et al. (1960) have linked denominationalism and prejudice, church attendance and prejudice, scholastic standing and prejudice, urban - rural residence and prejudice and socioeconomic status and





prejudice. Of the major religious groups they studied, Baptists showed highest prejudice, Catholics were intermediate and Jewish students were least prejudiced. Regular and non-church attenders were less prejudiced than those who claimed an intermediate amount of church attendance. Students who had high (B+) scholastic standing were less prejudiced than those students with low (C-) scholastic standing. Small town and rural students were more prejudiced than students from urban centers. Students whose fathers earned over \$20,000. a year were significantly more prejudiced than those who reported paternal income at \$5,000. per year or less. Although the study was not concerned with the broader concept of authoritarianism, the relationships cited here are relevant because there is a correlation between authoritarianism and prejudice (McCandless, 1961, p. 361). O'Reilly and O'Reilly (1954) investigated the relationship between devoutness of Catholics and anti-Semitic and anti-Negro attitudes. Almost all their subjects (212 young men and women in Catholic colleges and seminaries) reported that religion had a very marked influence on their upbringing. For women, the devoutness scale correlated  $+0.39$  with the anti-Semitism scale; for men the correlation was  $+0.31$ . The anti-Negro and anti-Semitism scales were highly correlated,  $+0.69$  for women and  $+0.68$  for men. Students scoring high on the devoutness scale also favored parish segregation for Negroes. Of those who favored segregation, 76.5 per cent scored in the upper half of the devoutness scale, whereas 74.5 per cent of those scoring low on the devoutness scale opposed parish segregation. Jones (1958), using 197 naval cadets at the Naval Air Station, Pensacola, Florida, investigated the





relationship between religious values and authoritarian tendency. The principal result of this study was the marked tendency for authoritarian cadets to report a religious background and to adopt religious values. Secondly, the adoption of theoretical and aesthetic values was negatively related to authoritarianism. In another study involving only Catholic students ( $N = 327$ ), Shinert and Ford (1958) found the total group to be non-ethnocentric to a marked degree and also that the daily communicant group (presumably most devout) was more non-ethnocentric than the non-daily communicant group. Because of the nature of the sample, Shinert and Ford do not generalize beyond the group studied.

It is extremely difficult to state with absolute certainty that religious belief and authoritarianism are inextricably bound together. Martin and Nichols (1960) cite the findings of Allen (1955), Khanna (1957) and Gregory (1957) to illustrate the paradox that religious people are more authoritarian than non-religious people. In their own study, Martin and Nichols found a correlation of only  $+0.18$  between religious belief and authoritarianism ( $N = 163$  university students). They conclude, on the basis of this and other findings, that:

Whatever the reason may be, although the present study does not find the religious college student to be the major exemplar of tolerance and humility, it does not find the generally negative picture to be inferred from previous studies either.  
(p. 7)

To clarify further the relationship between religious preference and authoritarianism, a study done by Rhodes (1960) is of importance. Rhodes used the F-scale and Srole Scale to obtain an index of authoritarianism among 1027 rural and urban high school seniors in Tennessee.





He found that the attitudes of an authoritarian character (relating to ethnocentrism and prejudice) expressed by the subjects were not independent of religious preference. Also, there was more variation among Protestants than between Protestants and Catholics with respect to authoritarianism. This last finding, says Rhodes, suggests that in this area of investigation, and possibly in others, that ". . . the time has come for the social scientist to explore alternative means of classifying religious orientation other than the tired old trichotomy: Catholic, Protestant, Jew." (p. 105)

#### Authoritarianism and social class

A connection between authoritarianism scores and indices of social class is suggested by research; the nature of the connection is hypothesized to derive from differential child rearing practices common to different strata of social class. Maccoby et al. (1954) found that, in general, lower class mothers used more rigid child-rearing practices, more punishment and permitted less aggression toward parents than did middle class parents. The development of authoritarian traits is associated with rigid child-rearing practices so one would expect that lower class children and adults would display behavior reflecting authoritarian dispositions more often than middle and upper class children and adults. This expectation is at least partially confirmed by the findings of Cohn and Carsch (1954) and Adorno et al. (1950). Cohn and Carsch found significant F-scale differences between a group of 117 German factory workers who had attended only Volkshule or Volkshule and Mittelschule (less well





educated), and a better educated group of 23 subjects who had attended Hochschule. The mean F-scores were 5.40 and 4.57 respectively ( $p < .01$ ). Adorno et al. found a similar pattern reflected in F-scale scores of college students, working class men, sailors and prisoners. Finally, as McCandless (1961) states: "The evidence of a relation between lower class socioeconomic status and authoritarianism is tenuous, but a connection is suggested." (p. 295)

The findings of Rhodes (1960) and Young et al. (1960) indicate that rural - urban residence is related to F-scale scores as well. There is a tendency for people from urban centers to be less authoritarian than those from small town and rural areas.

### Critical Thinking and Aesthetic Values

#### Critical Thinking

To offer the generalization that Catholic children, or more specifically, Catholic children who have attended parochial schools, have less critical thinking ability than children who have attended public schools, may at first appear preposterous. This section of the discussion is intended to illuminate the findings relating to this topic and delineate any trends which may appear tenable.

Shrepfer (1955) reports that public school graduates make higher marks than parochial school graduates as freshmen in college. His parochial school sample included graduates from Catholic, Episcopal and Quaker schools; no proportions are given. Hill (1961) found results which closely parallel Shrepfer's. However, the majority of Hill's





sample was composed of graduates from Catholic schools. Koos (1931) investigated this problem and his findings are essentially the same as the more recent results of Shrepfer and Hill. Koos' sample consisted of students from Catholic, Scandinavian and independent schools who were matched by sex, college aptitude and age with students from public schools. He found that all three groups (of private school students) contributed to the difference, but that the Catholic school students deviated most markedly from public school students.

Tate and Straub (1964) review the studies mentioned above and state that: "There apparently are no exceptions to the findings that, when scholastic aptitude is controlled, public school graduates make better grades as college freshmen than graduates from private schools, including both independent and church affiliated schools." (p. 74) However, the authors also indicate that generalizations cannot be made from these studies because of limited scope and ill-defined populations. Iwamoto (1958) reviewed relevant data to 1958 and cautions against over-generalization because there is no conclusive evidence to indicate the superiority of one type of school over another. Tate and Straub examined a study done by Denny (1962). Denny was investigating the relationship between religious belief and achievement; he removed the effects of parochial school attendance by comparing Catholic and non-Catholic students who attended public high schools. The samples consisted of high school students in grades 9 to 12 who were matched on socioeconomic status and level of education. This was done statistically by analysis of covariance. Total N's were 199 Catholic students and 500 non-Catholic





students. By means of analysis of covariance, he compared cumulative grade indexes of the group of Catholic and non-Catholic students. Denny reports:

The covariance analysis indicated that the answer to this question, "Do Catholic students and non-Catholic students attending the same public high schools differ significantly in their academic achievement?," was an emphatic no. These findings tend to question the notion that the intellectual accomplishments of Catholics are necessarily low because of their commitment to an "other worldly ethic." These Catholics are achieving academically. Whatever shortcomings we found in the academic achievement of our Catholic students were unrelated in their being Catholics. (p. 143)

Tate and Straub question Denny's interpretation of findings on the argument that he overlooked a significant sex-religion interaction. They re-calculated total adjusted mean grade indices and found that, assuming the variance of the adjusted grade indices is not more than .3, the Catholic boys did significantly poorer work than the contrast boys (the actual difference between grade indices was  $3.27 - 3.11 = 0.16$ ). For girls, the total mean adjusted grade index was 3.48 for Catholics and 3.38 for contrasts. The difference of 0.10 is significant at the 10 per cent level, unless the variance is greater than .3. Tate and Straub conclude on their analysis of the evidence that:

So far as the thinking abilities required in scholastic achievement are concerned, the evidence supports the hypothesis that students from public schools are superior to those from Catholic schools. The only important exception appears to be Denny's findings, and these findings are clouded by sex differences. (p. 77)

Tate and Straub investigated the problem in their own study. Of major interest are their findings concerning critical thinking and religion. The following tables have been taken from their work (1964) to clarify differences and magnitudes thereof.



TABLE I<sup>1</sup>

MEAN SCORES, DIFFERENCES, AND SIGNIFICANCE OF DIFFERENCES IN TESTS  
OF THINKING OF 33 NINTH GRADE STUDENTS WHO HAD ATTENDED CATHOLIC  
ELEMENTARY SCHOOLS AND 33 MATCHED STUDENTS WHO HAD ATTENDED  
PUBLIC ELEMENTARY SCHOOLS

TEST	MEAN CATHOLIC	MEAN PUBLIC	$\bar{X}$ DIFF.	SIG. DIFF.
Ideational Fluency:				
Groups of things	32.36	35.61	-3.25	.20
Uses	19.52	19.36	.16	.90
Consequences	33.06	32.48	.58	.70
Problem Solving:				
Seeing Problems	18.91	19.64	- .73	.60
Missing facts	18.00	19.88	-1.88	.07
Thought problems	8.18	8.59	- .41	.50
Critical Thinking	16.42	18.12	-1.70	.20

<sup>1</sup>Tate and Straub (1964), p. 78.







TABLE II<sup>1</sup>

MEAN SCORES, STANDARD DEVIATIONS, DIFFERENCES, AND SIGNIFICANCE OF DIFFERENCES IN TESTS OF PROBLEM SOLVING AND CRITICAL THINKING OF 76 CATHOLIC ACADEMY NINTH GRADE GIRLS AND 43 PUBLIC NINTH GRADE GIRLS

TEST	MEAN		STANDARD DEVIATION		DIFF.	SIG.
	CATHOLIC	PUBLIC	CATHOLIC	PUBLIC		
Problem Solving:						
Missing Facts	19.60	21.65	4.95	4.41	-2.05	.03
Thought Problems	10.24	10.84	3.20	3.02	- .60	.30
Critical Thinking						
	18.32	20.45	4.58	3.82	-2.13	.01

<sup>1</sup>Tate and Straub (1964), p. 80

The "Missing Facts" test was devised by Tate et al. (1959) while the "Critical Thinking Test" was constructed by Professor Ethel W. Maw of Bryn Mawr College. Both tests seemed to discriminate between groups of Catholic and public school students. Tate and Straub speculate that non-Catholic subjects, not knowing the correct answer, tended to respond with the neutral answer because of cautiousness, skepticism or the belief that suspended judgment is commendable, while the Catholic students avoided neutral answers because of credulity, impulsiveness or intolerance of ambiguity. Whatever the complete answer may be, the authors are quite certain that the differences in the critical thinking test were at least partly attributable to sets antecedent to the test itself. Furthermore, they state: "There is no way in the present study to determine whether the sets of attitudes originate in being Catholic or in



attending a Catholic elementary school; however, several considerations suggest that they are at least strengthened in the school." (p. 84)

The writers then explain that Catholic pedagogy emphasizes tradition and faith, authoritarian teaching methods, memory, drill and the theocentricity of all knowledge.

Finally, the part of Cheal's (1963) work which deals with grade points of separate and public school children in Alberta is relevant. The data he reports seem to indicate quite clearly that Catholic children, or more accurately, Catholic children attending rural and small town separate schools, do less well on provincial examinations than their public school counterparts. The differences between children attending urban schools are so slight that one cannot place too much confidence in them despite the large sample studied. It is quite probable that teacher qualifications are more salient than denominationalism, especially in rural areas. This remains to be studied and remains an important question.

#### Preference for Aesthetic Values

As a sequel to the last section it is appropriate to include the variable of aesthetic values preference. The literature is scanty on this topic and is loosely connected. However, if the present study can clarify differences on this dimension, it may serve to facilitate an explanation of the "antecedent sets" discussed by Tate and Straub (1964).

Blatt (1961) and Blatt and Stein (1959) have done extensive work on the correlates (personality and physiological) of efficient problem





solvers. The most significant finding on these studies was that efficient problem solvers did score high on the aesthetic dimension of the Allport-Vernon Lindzey Scale of Values. This was the only consistent finding the researchers made and they are quite frank about it. They explain that the efficient problem solvers appeared to immerse themselves in the problem; they became part of the problem and searched for a solution from within. The inefficient problem solvers appeared to attempt solution by adapting the problem to a pre-learned strategy or set. This hindered them insofar as solution of the experimental task was concerned.

Getzels and Jackson (1960), in their oft-criticized study of creative children, mention that the creative group preferred complex, aesthetic designs and were more flexible in their orientation to life. They relate this behavior to a more liberal child-rearing atmosphere in the home. It may well be that non-directive child-rearing practices present the child with ambiguity and complexity early in life; in order to function adequately, the child has to structure the ambiguity and/or solve the problem he faces. Davids (1964) has devoted much time and effort to help clarify this relationship.

It was mentioned previously that religious belief also seems to be related to values preference. Garrison (1961, 1962) and Spoerl (1961) have shown that Jews, Episcopalians and Unitarians score high on world-mindedness and social, theoretical, aesthetic values. Catholics scored in the middle of the continuum on which the various sect groups scored at the opposite end. (see page 13)





The trend which appears to be present on dimensions of n Achievement, authoritarianism and critical thinking is also present for aesthetic values preference, at least to some extent.

#### Summary of findings of past research

There is reason to suspect that tenure of religious beliefs is related to lower scores on n Achievement, equalitarianism, critical thinking and aesthetic value preference measures. Furthermore, the variation among Protestants appears greater than the variation between Protestants and Catholics in some instances. It is suggested that a continuum of rejection - acceptance of socio-secular values underlies the differentiation of relative positions of denominations on these dimensions. Socio-economic status and rural - urban residence have been shown to be related to n Achievement and authoritarianism as well as, to a limited extent, academic achievement.

A simple categorization of believers as Protestant, Catholic and Jew is misleading and inaccurate.

#### Theoretical Considerations

In order to unify the observed phenomena which have been summarized in the foregoing pages, it is necessary to re-view the apparently disconnected events through a theoretical framework. This will not only add cohesiveness, real or ideational, but should also serve as a foundation from which predictions (hypotheses) can be derived.

It would be scientifically advantageous in the mathematical sense to order the observations according to a simple cause - effect relation-



ship. A pseudo-Hullian model would be mathematically feasible if stimulus - response relationships could be quantified accurately. Perhaps this will some day be possible.

However, for the present, a psychologically meaningful theory would appear more practical. The loss of esoteric mathematical quantification is more than compensated for by a more meaningful, but necessarily less precise, theory based on modes of conceptualizing events in the environment.

The dimensions of conceptualizing with which we are concerned are, in Harvey, Hunt and Schroder's (1961) terminology, openness - closedness and centrality - peripherality. How can the variables of religious belief, socioeconomic status, intelligence, sex and ethnicity predispose human beings to respond to questionnaires in the directions indicated? Is it possible to consider Achievement, authoritarianism, critical thinking and aesthetic values preference to be interrelated dimensions whose interrelation is some direct function of particular conceptualizing modes?

Harvey et al. outline a theory of conceptualizing which is dependent upon differentiation and integration of stimuli impinging on the organism. These processes are not unalterably determined by neural structures present at birth; after the first concepts have been attained, their very presence in the organism's conceptual structure necessarily influences the differentiation and integration of new information. The conceptual structure, in this theory, is the self; changes in the structure necessitate changes in the organism's mode of perceiving and conceptualizing.





The centrality of a concept refers to the relative importance of the concept to the organism; openness is a characteristic which is indicative of the relative ease with which the organism is able to assimilate new information. How open a structure (person) is may be interpreted as a function of the concreteness - abstractness which characterizes the structure. The degree of abstractness which characterizes the structure is related to child-rearing practices and the kinds of techniques used to convey information to the child; speech is one of the most important of these.

The kind of information and the manner in which it is transmitted, would, in the light of this particular theory, appear to form the core ideas of the problem at hand. For this reason the writer must draw from the literature which offers suggestions concerning differences in these child rearing variables as a function of differential religious convictions, socioeconomic class, sex, intelligence and ethnicity. Zentner (1964) emphasizes the traditional view that Catholics tend more to view events through a conceptual framework which is predominantly theocentric, i.e., God and religion are central to the processing structure. In addition to this centrality of religion in processing information, Catholics are also more likely to be less adequate in differentiation and integration because, so the literature suggests, the ideas are transmitted in a manner not conducive to encouraging individual differentiation and exploration. Tate and Straub (1964) emphasize the authoritarian techniques of Catholic teachers; the "right" ideas are infused with an aura of completeness, finality and correctness. Few shades of grey (ambiguity) are





necessary or tolerated. Catholic parents are assumed to follow similar procedures in educating their young.

On the other hand, Protestant children are not subjected to as absolute a form of religious socialization; the conceptual structure of the Protestant child, particularly those children whose parents are Episcopalian or Unitarian, is more likely to be sociocentric rather than theocentric. This then is one reason why the Protestant ethic and Weber's hypotheses are validated by research. If one accepts the above as true, then one also is inclined to accept that Protestant children will be more likely to have a rational, as opposed to fideistic, orientation to life in general. This rational orientation is more conducive to accurate differentiation and integration than the fideistic orientation, at least in the social sphere of life.

If the foregoing is true (and for reasons to be explained later it may have only historical validity and not be relevant today) then it would seem obvious that Protestant children so educated would tend to be more conscious of socially desirable performance, one aspect of which is the desire to achieve. Similarly, they should be less authoritarian because they are more sensitive to relatedness (due to superior differentiation - integration) than Catholics. On the negative side ("negative" relative to current psychological theory), the increased complexity of Protestants' structuring would seem to be conducive to higher frequency of neuroses (see Zentner, 1964).

That aspect of religious socialization which could cause differential performance on critical thinking tasks would most probably be the





relative absoluteness which characterizes the input being processed by the organism. Children learn not only the concept intended, but also the more subtle modes of transmission and the certitude or centrality the information has for the transmitter (parent, teacher). Presumably Catholic children would be more frequently exposed to input accompanied by certainty and absoluteness on the part of the stimulus source; years of such exposure could theoretically predispose the child to learn not only the concepts originally intended, but also a concept involving degree of certainty and absoluteness with which one should hold information. Again, according to the traditional view, Protestant children would be more inclined to learn not absoluteness, but relativity and more acute discriminatory qualities of differentiation and integration. If one assumes the above line of argumentation to be valid, the findings of Tate and Straub (1964) acquire a degree of significance:

One may speculate that the non-Catholic subjects, not knowing the correct answer, tended to respond with the neutral "not enough facts" because of cautiousness, skepticism, or the belief that suspended judgment is generally commendable, while the Catholic subjects tended to avoid "not enough facts" because of credulity, impulsiveness, or intolerance of ambiguity. But whatever the complete explanation, the differences in the critical thinking test would appear to arise in part from sets antecedent to the test itself. (p. 84)

Relative differences between Protestants and Catholics on values preference questionnaires can, in part at least, be attributed to the centrality of religion to the organism and the quality of absoluteness of the processing unit. Protestants, being more sociocentric and tolerant of complexities, would, theoretically at least, tend to prefer worldly oriented along with complex and aesthetic values more frequently





than Catholics.

Thus, within the framework of the conceptual theory of Harvey, Hunt and Schroder, it is quite possible to offer a tentative link between religious socialization and the relevant dependent variables. One would predict, on the basis of the theory, that population means on these variables do differ. Some previous work indicates that such is the case.

The social class stratum in which one has membership also exposes the child to different information and different modes of transmitting information. Consequently, the socioeconomic variable is important insofar as it influences conceptual processes.

To delimit the problem so it can be viewed within the theory of Harvey et al., the influences of social class on the dimensions of concreteness, temporal orientation and child rearing practices will be briefly discussed.

In addition to the usual handicaps of lack of books and learning aids in the home, the lower class child appears to undergo a decidedly different rearing pattern insofar as interpersonal communication is concerned. The lower class parent is more didactic and urgent in his communications; the socialization process is "order oriented" and the child is less frequently told why he should do this or that. Presumably, exposure to this type of communication would facilitate development of authoritarian tendencies. Similarly, the ability to examine and differentiate information could be impaired and hinder the child's performance on critical thinking tasks.

To complete the relationship with the variables of Achievement





and aesthetic values preference, that characteristic of lower class socialization which might be designated temporal concreteness is of theoretical importance. The lower class child, according to McCandless, is acutely aware of here and now events; he structures in terms of the present. If this is so, it would lead not only to a tendency for impulsivity, but also to very poor differentiation and integration of future - relevant information. Planning for distant goals would not take place and the emphasis would be more on obtaining rewards rather than perfecting skills. Similarly, the concreteness of the conceptual structure would be incompatible with a preference for aesthetic values since these involve much complexity.

Theoretically then, it is possible to relate social class and denominationalism to modes of conceptualizing. Similarly, one can suggest that inherited neural potential or intelligence would influence conceptualization processes. This is Intelligence A as Hebb (1958) refers to it. Intelligence B, or developed intelligence, is also an important variable since, as previously stated, this developed conceptual network determines the integration and meaning of new informational input.

There is evidence to suggest that our Western culture is characterized by a different socialization pattern for the different sexes. Boys are encouraged to be more active and stimulus seeking than girls. This too, would influence conceptual processes to some extent.





### Domestic and temporal considerations

It is not correct to assume that mere exposure to religious practices is of itself sufficient to develop religious devoutness in a child. The phenomenon of identification, for example, has been shown to be especially relevant for adoption of religious ideas. Erickson (1964) investigated the question of how great the school's influence really is in increasing religiosity of students. He elaborates on the parent - child relationship as a key factor in such development:

. . . There appeared a statistically significant interaction involving three important background variables, Parent Religiousness, Parent-Subject Congeniality and Church Training. ( $p < .025$ ) . . . In general, however, they (revealed relationships) supported the inference that, though the church may be effective to some extent as a supplementary agency, religious attitudes are developed primarily through parent - child interaction. The child's identification with the parent, the data suggest, is in important respects facilitated when a congenial relationship exists and hindered when the relationship is uncongenial.

A second consideration which should not be overlooked is the impact of ecumenism on Catholics. In psychological terminology, ecumenism might be designated a trend to greater openness with respect to those ideas formerly considered to be threatening because the processing units were closed. In addition to this, increased exposure to new ideas and new interpretations of old ideas has been the result of rapidly expanding media of communication. The joint influence of both these factors would appear to increase the homogeneity of belief of all Christians since both trends are predominantly sociocentric.

For example, Rossi and Greeley (1964) offer the following information which contradicts the view of O'Dea (1958) who used data which were





true only ten years ago:

Apparently the Catholic colleges are in a period of transition. The Knapp studies of a decade ago and the self-criticism of certain Catholic scholars (O'Dea listed here) had indicated that the graduates of Catholic colleges were not interested in scholarly careers. However, by June, 1961, no evidence of this was to be found. Indeed, graduates of the Catholic colleges were more likely to choose such careers than the national average. The Catholic colleges ranked behind the Ivy League Schools and behind a group of high quality private colleges, but ahead of the Big Ten universities and the middle western liberal arts and science schools. (p. 39)

It is possible that differences between Protestants and Catholics on the aforementioned dimensions are, or soon will be, of historical interest only, as Zentner (1964), says.

#### Devoutness and Prediction

In the present study, devoutness, not denominationalism, is the crucial independent variable to be considered. This study will concern itself with an intra-denominational investigation where relevant variables other than devoutness itself are controlled.

If the foregoing theory regarding denominational differences is true, it is equally true that the theory should apply to devoutness differences within a denomination. In other words, if we can state with some assurance that Catholics are more dogmatic than Protestants because they belong to a more authoritarian church than Protestants, then it seems valid to say that very devout Catholics differ from non-devout Catholics because they are differentially influenced by the church.

This permits an investigation of the conceptual model hypothesized to account for the relatedness of need Achievement, dogmatism, critical





thinking and preference for the aesthetic. It will not permit inter-denominational comparisons, but inter-devoutness comparisons can be attained. This is the purpose of the study.

Several studies reviewed in the foregoing pages have posited a dimension of society acceptance - rejection on which various denominations are differentially located. The positions of the denominations appear to be related to the dependent variables under consideration. The present study investigates whether or not intra-denominational variability in devoutness (frequency of church attendance) is similarly related to these variables.



## CHAPTER IV

### DEFINITIONS, ASSUMPTIONS AND HYPOTHESES

#### I DEFINITIONS

The following definitions have been adopted in the present study:

Need Achievement The motivation of the individual to achieve excellence and high standards of performance. It is need Achievement as considered by McClelland (1953) and is to be distinguished from that which is discussed by Edwards (1957) or any other which is measured in a direct way. The need Achievement Test is to be found in Appendix A.

Dogmatism This term refers to the relative closedness of the processing unit. Behaviorally, we assume that the more closed the system, the more will the world be seen as threatening, the greater will be the belief in absolute authority, the more will other persons be evaluated according to the authorities they line up with, and the more will peripheral beliefs be related to each other by virtue of their common origin in authority, rather than by virtue of intrinsic connections. Further, with respect to organization of the belief-disbelief continuum which Rokeach (1960) discusses, the more closed the system, the more is the acceptance of a particular belief assumed to depend on irrelevant internal drives and/or arbitrary reinforcements from external authority. The dogmatism scale is contained in Appendix B.

Critical Thinking This refers to the ability to analyze given informa-





tion and select the most appropriate response from a set of alternatives. In the present study a total critical thinking score was obtained from two subtests; one was predominantly verbal and the other was verbal - numerical. The critical thinking tests are presented in Appendix C.

Aesthetic Values Preference "The tendency to value form and harmony. Experiences are judged from the standpoint of grace, symmetry or fitness and impressions are judged for their own sake." (Allport et al. (1960), p. 4) This scale is presented in Appendix D.

Religious devoutness The frequency of behaviors directly pertaining to religious practice by the individual respondent and by his family. The devoutness scale is contained in Appendix E.

Socioeconomic status The relative position of a family on a continuum of possession-nonpossession of material goods. It is closely related to occupation of the father. The instrument used to measure socioeconomic status is presented in Appendix F.

Intelligence This term might be defined as a score on the California Test of Mental Maturity. In a more general sense, intelligence is considered to be intellectual ability or mental power, which is the product of interaction between genetic endowment and experience. Intelligence is not directly measurable but is inferred from the results of tests such as the one mentioned above.

Sex A dichotomous classification as male or female.





Ethnicity A dichotomous classification as monolingual (English) or bilingual (English plus another language).

## II ASSUMPTIONS

Relevant information concerning the reliability of the measures is contained in the Appendices with each instrument. Construct validity has been checked by factor analysis of the correlations among the dependent, independent, and other variables. The factor matrix is contained in Appendix G; it can be seen that the correlations and factor loadings offer support for the belief that the measures are interrelated according to theoretical expectations.

It would have been advantageous to have taken several measures on each variable; however, this was impossible because of the time restrictions. It is assumed that instrumentation is adequate for testing the hypotheses and that the large sample will minimize spurious results which might be attributable to a smaller sample.

## III HYPOTHESES

Hypothesis I: On the basis of the traditional psychological theory, it is hypothesized that highly devout members of the sample will obtain a significantly higher dogmatism score than low devout members when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.<sup>1</sup>

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<sup>1</sup>Throughout this paper, use of the phrase "statistically controlled," means that socioeconomic status, sex, ethnicity and intelligence were free to absorb criterion variance and the influence of devoutness on the remaining variance was being tested.



Hypothesis II: High devout subjects will obtain a significantly lower need Achievement score than low devout subjects when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.

Hypothesis III: High devout subjects will obtain a significantly lower critical thinking score than low devout subjects when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.

Hypothesis IV: High devout subjects will obtain a significantly lower aesthetic value score than low devout subjects when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.

Hypothesis V: On the basis of the theory postulated as underlying the responses of individuals on the dependent variables, it is hypothesized that a factor analysis of the correlations between these variables will show a bipolar factor on which need Achievement, critical thinking and aesthetic values preference load in one direction and dogmatism in the opposite direction.

It is expected that this factor will be the first factor extracted from the correlation matrix if principal axis factoring is used. As stated, this hypothesis is an attempt to obtain empirical evidence for the adequacy of the conceptualization of the problem in the framework provided by Harvey et al. (1961).





## CHAPTER V

### EXPERIMENTAL DESIGN

#### I SAMPLE

The sample consisted of 351 Grade VIII students in the Edmonton Separate School System. These students were enrolled in eleven different classes in eight different schools. The superintendent, Mr. H. A. MacNeil, thought that this group was representative of the population of Grade VIII students in the Edmonton Separate School System.

The battery of tests was administered to each class during two hour sessions between March 2 and 17, 1965. A pilot study in January indicated that the children understood the instructions and vocabulary. During the testing session rapport was very good and all children completed the tests in two hours. Scheduled breaks were observed; otherwise the testing continued uninterrupted.

The full sample, whose mean age was 168.18 months with a standard deviation of 8.86 months, had a mean full-scale intelligence score on the California Test of Mental Maturity, Short Form, of 102.61 with a standard deviation of 12.71. The sample included 180 boys and 171 girls. The mean and standard deviation obtained by the total sample on each test are included in the appendices containing each test.





## II INSTRUMENTS

### Dependent Variables

Dogmatism An adaptation of Rokeach's Dogmatism Scale was used in this study. It was used successfully by Anderson (1962) in his research with adolescents in Edmonton.

The scale contains twenty-four items which are answered +3, +2, +1, if the individual agrees wholeheartedly, pretty much, a little, respectively or -3, -2, -1 if the individual disagrees wholeheartedly, pretty much, a little, respectively. A total dogmatism score is calculated by adding 4 to each response (this excludes negative numbers) and summing the transformed scores to obtain the final score. A copy of the Dogmatism Scale is to be found in Appendix B. It is titled "Opinions."

Need Achievement The Projective test devised by McClelland to measure need Achievement was used. It consists of four pictures which are presented individually to the subject for twenty seconds. After viewing each picture, the subjects are asked to write a story about the picture. In order to facilitate their response, a guide is presented to help structure the story temporally and thematically.

The subjects are told that this is a test of creative imagination and are advised to write unusual stories. A copy of the instructions, and answer sheet are found in Appendix A. Scoring was done according to McClelland's (1953) criteria.

Aesthetic Values Sixteen of the eighteen items contained in the



Allport-Vernon-Lindzey Scale of Values and which purport to measure preference for the aesthetic were adapted for use with this age group. The two items which were omitted pertained to choosing a marriage partner and a specific piece of art and were not readily adaptable to this age group. Responses were scored according to instructions of Allport et al. contained in the test manual. Appendix D contained the instructions and items of this scale.

Critical Thinking Copies of the Missing Facts Test devised by Tate et al. (1959) and the Critical Thinking Test devised by Maw (Tate, 1964) were obtained from the University of Pennsylvania. It was necessary to shorten the tests so that four of the seven paragraphs used by Tate were included (25 items) and nineteen of the thirty arithmetic problems from the Missing Facts Test were selected randomly.

Intelligence The Edmonton Separate School Board presently uses the California Test of Mental Maturity to obtain scholastic aptitude scores on Grade VIII pupils. The test was administered in the fall of 1964 and scores recorded in cumulative record cards. These scores were used by the present writer as a measure of intelligence.

Socioeconomic status An adaptation of the Gough Social Status Inventory which was used by MacArthur and Elley (1963) was used by the writer as an index of socioeconomic status.





### III TEST ADMINISTRATION

The battery of tests was administered to the Grade VIII classes which comprised the sample during the first three weeks of March, 1965.

All the tests and questionnaires were contained in one booklet which each student received. Each part of the battery required careful explanation and illustration; in order to avoid confusion and unnecessary delay, the students completed each section as a group before proceeding to the next test. Total time for each session was two hours.

### IV STATISTICAL ANALYSIS

The choice of a statistical technique for analysis of raw data involves several considerations. Firstly, the experimenter considers those techniques which, in a general sense at least, can be used to obtain the information he is seeking. Secondly, he must recognize that some techniques, though perhaps yielding more information than others, are inefficient to use because of technical limitations. The choice of the analytic technique ultimately involves contemplation of these factors and the experimenter must try to make the best decision for his particular circumstances.

#### Multiple Linear Regression Analysis

The major analyses in the present study utilize a very efficient technique developed by Bottenberg and Ward (1963) of the Lackland Air Force Base, Texas. This technique, known as Applied Multiple Linear





Regression Analysis involves vector operations in place of traditional summation operations and is well suited to computer capabilities. Although at first it may not seem radically different from a stepwise regression analysis, subroutines developed by Bottenberg and Ward place a very powerful and efficient tool in the hands of the experimenter. For example, the Datran subroutine which precedes the initial computations enables the experimenter to generate dichotomous vectors from continuous vectors and to generate any interaction vectors which he thinks are relevant to his analyses. Even if he does not wish to include the interaction vectors in his models, the correlation between the generated vectors and the criterion is output by the computer and can serve as an important source of information for developing new hypotheses.

It can be seen that this type of analysis is applicable to the two major areas of research distinguished by Hays (1964). For regression studies where the experimenter is testing a stated hypothesis it is adequate and efficient; for correlational studies where the experimenter is seeking hypotheses, it is equally efficient.

Use of the analysis does not necessitate normality of distribution of predictor variables. (Bottenberg and Ward, 1963, p. vi) Applied multiple linear regression, as the title implies, seeks only to clarify whether or not a critical variable, when added to a linear expression, significantly reduces the criterion error sum of squares.

The general approach is to express a vector of criterion variable data as a linear combination of a set of predictor vectors:



$$Y = k + a_1X(1) + a_2X(2) + a_3X(3) + E$$

where

$Y$  is a vector of criterion variable data ( $N \times 1$ )

$X(1)$ ,  $X(2)$ ,  $X(3)$ , are vectors of predictor variable data ( $N \times 1$ )

$a_1$ ,  $a_2$ ,  $a_3$  are unknown weights associated with the predictor vectors

$E$  is an error or residual vector ( $N \times 1$ )

$N$  is the number of observations

$k$  is a constant

The problem is to find a set of weights which minimize the sum of squares of the elements of vector  $E$ . Weights selected in this way are called "least squares weights." We wish to minimize

$$\sum_{i=1}^N (e_i)^2 = (e_1)^2 + (e_2)^2 + (e_3)^2 + \dots + (e_N)^2$$

$N$  = number of observations.

In the present study, the application of this model is analogous to an analysis of covariance. One of the faults of many studies dealing with religion is that they do not have sufficient controls on other variables which are related to the criterion. These other variables may in fact be the variables which influence criterion scores though this influence is attributed to some aspect of religion or religious socialization. Experimentally, one is able to control the effects of salient variables by matching subjects on these variables and testing the effect of the independent variable under consideration. Statistically, the same end is attained by an analysis of covariance when conditions are suitable or, as in the present study, by the multiple linear regression analysis.





It should be recognized that the adequacy of covariance or multiple regression analyses depends on the type of relationship between covariates and criterion. If the relationships are essentially linear, then these models are adequate. If the relationships are nonlinear, the error term in the linear models includes nonlinear variation in the covariate as well as all other sources of variation which are not under direct or statistical control.

Winer (1962) advocates stratification on covariates and a direct analysis of variance when there is reason to suspect nonlinear covariate - criterion relationships. On the basis of the research and theory posited in this study, the writer is concerned with linear relationships and is seeking to test hypotheses by means of a linear model. There is no evidence on which one can hypothesize other relationships although one is completely free to seek such evidence.

In order to test the first four hypotheses, the following general and restricted models were used.

Unrestricted (general) model:

$$Y = k + a_1X(1) + a_2X(2) + a_3X(3) + a_4X(4) + a_5X(5) + a_6X(6) + a_7X(7) + E_1$$

where:

Y is a criterion vector (N x 1)

X(1) is a vector representing sex of respondent (N x 1)

X(2) is a vector representing ethnicity (N x 1)

X(3) is a socioeconomic status vector (N x 1)

X(4) is an intelligence vector (N x 1)

X(5) (6) (7) are devoutness vectors (N x 1), containing categorical information (see pp. 51-52).





$E_1$  is an error vector of full model ( $N \times 1$ )

$a_1 \dots a_7$  are least squares weights associated with predictor vectors

$N$  is the number of observations

$k$  is a constant

Restricted model:

$$Y = k + a_1X(1) + a_2X(2) + a_3X(3) + a_4X(4) + E_2$$

where:

$Y$  is a criterion vector ( $N \times 1$ )

$X(1)$  is a vector representing sex of respondent ( $N \times 1$ )

$X(2)$  is an ethnicity vector ( $N \times 1$ )

$X(3)$  is a socioeconomic status vector ( $N \times 1$ )

$X(4)$  is an intelligence vector ( $N \times 1$ )

$E_2$  is an error vector of restricted model ( $N \times 1$ )

$a_1 \dots a_4$  are least square weights associated with predictor vectors

$N$  is the number of observations

$k$  is constant

The null hypotheses were expressed:

$$H_0: (E_1)^2 - (E_2)^2 = 0$$

which simply means that the error sum of squares obtained by using the unrestricted model is equal to the error sum of squares obtained from the restricted model or, in terms of the study, religious devoutness as measured herein, did not significantly reduce criterion error sum of squares after the effects of sex, ethnicity, socioeconomic status and



intelligence had been controlled.

The test of the hypothesis involves computation of the F statistic:

$$F = \frac{R_u^2 - R_r^2 / m_1 - m_2}{1 - R_u^2 / N - m_1 - 1}$$

where:

$R_u^2$  is the squared multiple correlation from full model

$R_r^2$  is the squared multiple correlation from restricted model

N is the number of observations

$m_1$  is the number of unknown weights associated with full model

$m_2$  is the number of unknown weights associated with restricted model

In effect, one is testing the significance of the reduction in error sum of squares since, (in this study)

$$R_u^2 = B_1 r_{1c} + B_2 r_{2c} + B_3 r_{3c} + B_4 r_{4c} + B_5 r_{5c}$$

$$R_r^2 = B_1 r_{1c} + B_2 r_{2c} + B_3 r_{3c} + B_4 r_{4c}$$

where:

$B_{1...4,5}$  are beta coefficients

$r_{1c}, \dots, r_{4c}, r_{5c}$  are predictor, criterion correlations

$R_u^2$  is the squared multiple correlation from unrestricted model

$R_r^2$  is the squared multiple correlation from restricted model





and

$$e_i = \hat{Y}_i - Y_i$$

where:

$e_i$  is the error for person  $i$

$\hat{Y}_i$  is the predicted score for person  $i$  on variable  $Y$   
obtained from unrestricted model

$Y_i$  is the obtained score for person  $i$  on variable  $Y$

and for purposes of simplification, considering standardized variables,

$$\hat{Y}_i = B_1 Z_{1i} + B_2 Z_{2i} + \dots + B_m Z_{mi}$$

where:

$B_1 \dots B_m$  are beta coefficients for predictors 1 to  $m$

$Z_{1i} \dots Z_{mi}$  are standard scores on predictors 1 to  $m$  for  
person  $i$

then

$$\begin{aligned} e_i &= (B_1 Z_{1i} + B_2 Z_{2i} + \dots + B_m Z_{mi}) - Y_i \\ e_i^2 &= [(B_1 Z_{1i} + B_2 Z_{2i} + \dots + B_m Z_{mi}) - Y_i]^2 \\ \sum_{i=1}^N e_i^2 &= \sum_{i=1}^N [(B_1 Z_{1i} + B_2 Z_{2i} + \dots + B_m Z_{mi}) - Y_i]^2 \end{aligned}$$

it is obvious that  $\sum_{i=1}^N e_i^2$  is inversely related to the magnitude of the relationship between predictors and criterion. Since the only difference between  $R_u^2$  and  $R_r^2$  is the term  $B_5 r_{5c}$  (which is really the amount of criterion variation accounted for by the devoutness vector after the effects of the covariates are removed), we are testing whether or not reduction in error sum of squares obtained from the full model is significantly greater than the error sum of squares from the restricted model.





### Factor Analysis

In order efficiently to test the fifth hypothesis, the matrix of correlations between the dependent variables will be factor analyzed by Hotelling's (1933) method for principal axis factoring.

In general, factor analysis is a technique for reducing the dimensionality of an  $n$  test space to an  $m$  factor space where  $m$  is less than  $n$ . A factor is a hypothetical variable or dimension to which several tests are related: by considering these  $m$  dimensions rather than the  $n$  tests, one is in effect reducing the space to more fundamental dimensions. For the purpose of this study we are only concerned with the magnitude and directionality of test loadings on the first factor of the initial solution.

An assumption implicit in the above discussion is that significant relationships do in fact exist between the dependent variables.

There is no formal test of the hypothesis as it is stated; rather, the adequacy of the conceptualization of the interrelationships will be evaluated subjectively, but with empirical findings as a guide.



## CHAPTER VI

### RESULTS

Since the first four hypotheses were tested using the same technique, the results in each case will be reported in a similar way. This should facilitate interpretation and permit parsimonious presentation.

In each case the general or unrestricted model was tested against the restricted model to determine whether or not the inclusion of a devoutness vector significantly reduced the error sum of squares. Five measures or indices of devoutness were considered; in order to objectify the devoutness measure as far as possible, the writer considered the frequency indicated as a response to the first five items on the Religious Practice Inventory as measures of devoutness. Each student responded to the items:

1. I go to Church.
2. My mother goes to Church
3. My father goes to Church.
4. Our family says prayers together at home.
5. I say prayers alone.

by indicating the frequency with which these behaviors occurred. The frequencies from which each respondent was asked to choose were:

1. every day
2. every two or three days
3. once a week
4. once a month
5. once a year
6. never

Subjects were then classified as "high devout," "moderately devout"





and "low devout" on each item if they indicated 2 or 1, 3, 4 to 6, respectively. The classifications were easily generated as dichotomous vectors using the Datran subroutine of the Persub battery and the vectors were entered into the unrestricted models to determine whether or not the classification did indeed relate to criterion performance after sex, ethnicity, intelligence and socioeconomic status effects had been removed.

### Hypothesis I

Highly devout members of the sample will obtain significantly higher dogmatism scores than low devout members when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.

TABLE III

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP  
BETWEEN DEVOUTNESS AND DOGMATISM

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.0301	.0206	2/344	1.69	.10 < p < .25
2	.0462	.0206	2/344	4.64	.001 < p < .01
3	.0288	.0206	2/344	1.45	.10 < p < .25
4	.0216	.0206	2/344	0.17	N.S.
5	.0257	.0206	2/344	0.91	N.S.

In addition to magnitude of differences, the writer was investigating directionality of differences on dependent variables among groups classified by devoutness. Consequently it was considered appropriate to





increase the power of the statistical tests by increasing the alpha error probabilities above the standard level of .05. In other words we shall recognize differences as being significant which might ordinarily be overlooked. This will then permit inspection of plots which illustrate the direction of differences. In all cases the alpha error probabilities associated with the significance of the reduction in criterion error sum of squares will be given; the reader may wish to consider magnitude only and concern himself with the conventional alpha error probability levels. It is the writer's opinion that this latter approach is to be avoided because the directionality of differences rather than the absolute magnitudes thereof add more information when one considers the purpose of this study.

The information contained in Table III indicates that the frequency of the mother's church attendance is related to dogmatism scores. The probability that the reduction in error sum of squares obtained by using the full model could occur by chance is less than one in a hundred. For purposes of clarification we have signified that frequency of personal and paternal church attendance is also related to dogmatism scores. This enables the writer to inspect the profiles obtained by plotting predicted dogmatism scores for high, moderate and low devout groups classified by response to each of the three items. In this way it is possible to ascertain whether or not the direction of differences is similar in each case.

In the plots which follow throughout this chapter, the following arbitrary values were assigned to the variables which were controlled statistically:



Sex - male

Ethnicity - monolingual

Socioeconomic status - 10.00

Intelligence - 100.00

These same values will be used in all subsequent plots. Figures 1, 2 and 3 illustrate the predicted scores on dogmatism for groups classified as high, moderate and low devout by frequency of maternal, personal and paternal church attendance.

FIGURE 1

PLOT TO ILLUSTRATE ITEM TWO, DOGMATISM RELATIONSHIP

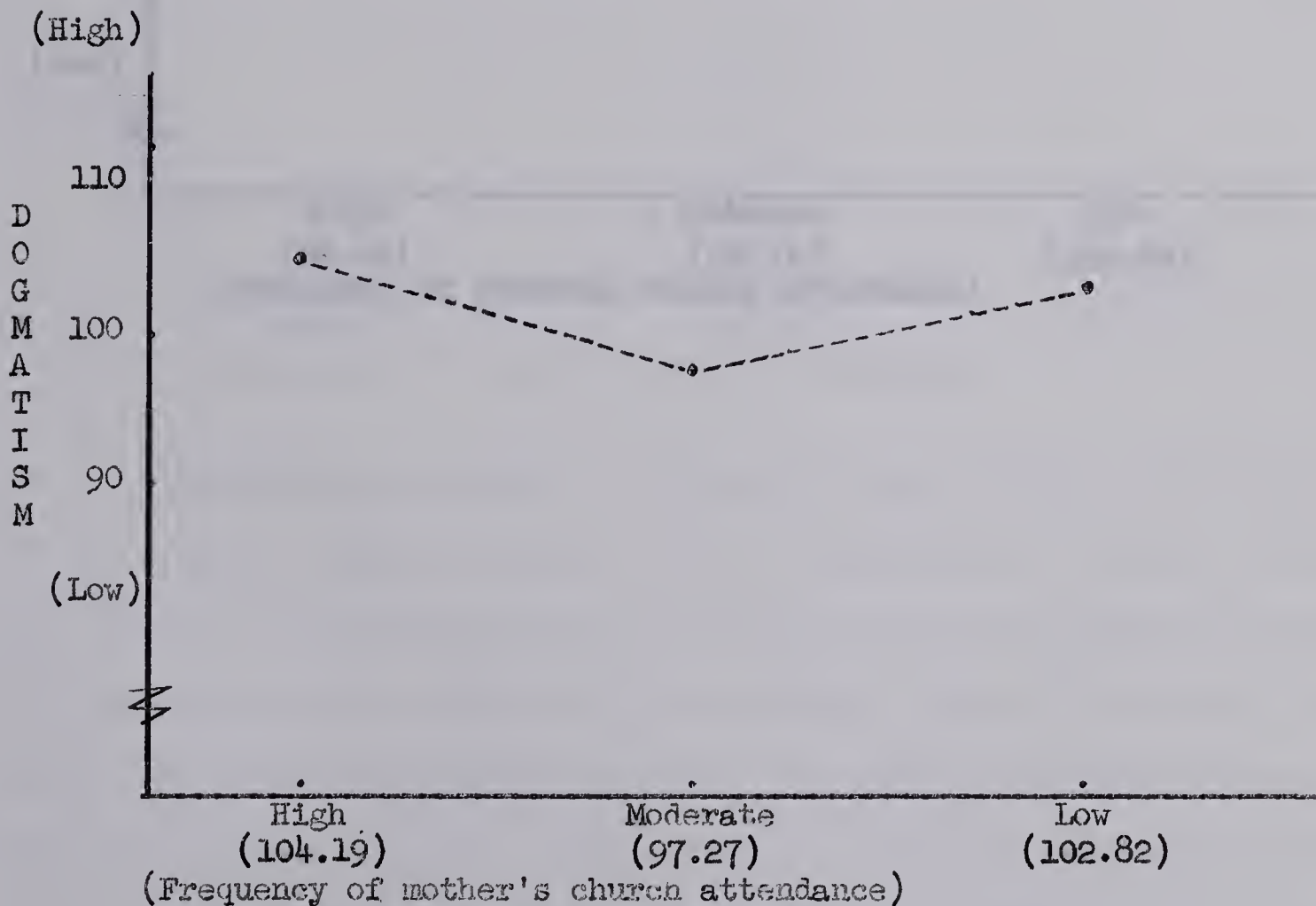






FIGURE 2

PLOT TO ILLUSTRATE ITEM ONE, DOGMATISM RELATIONSHIP

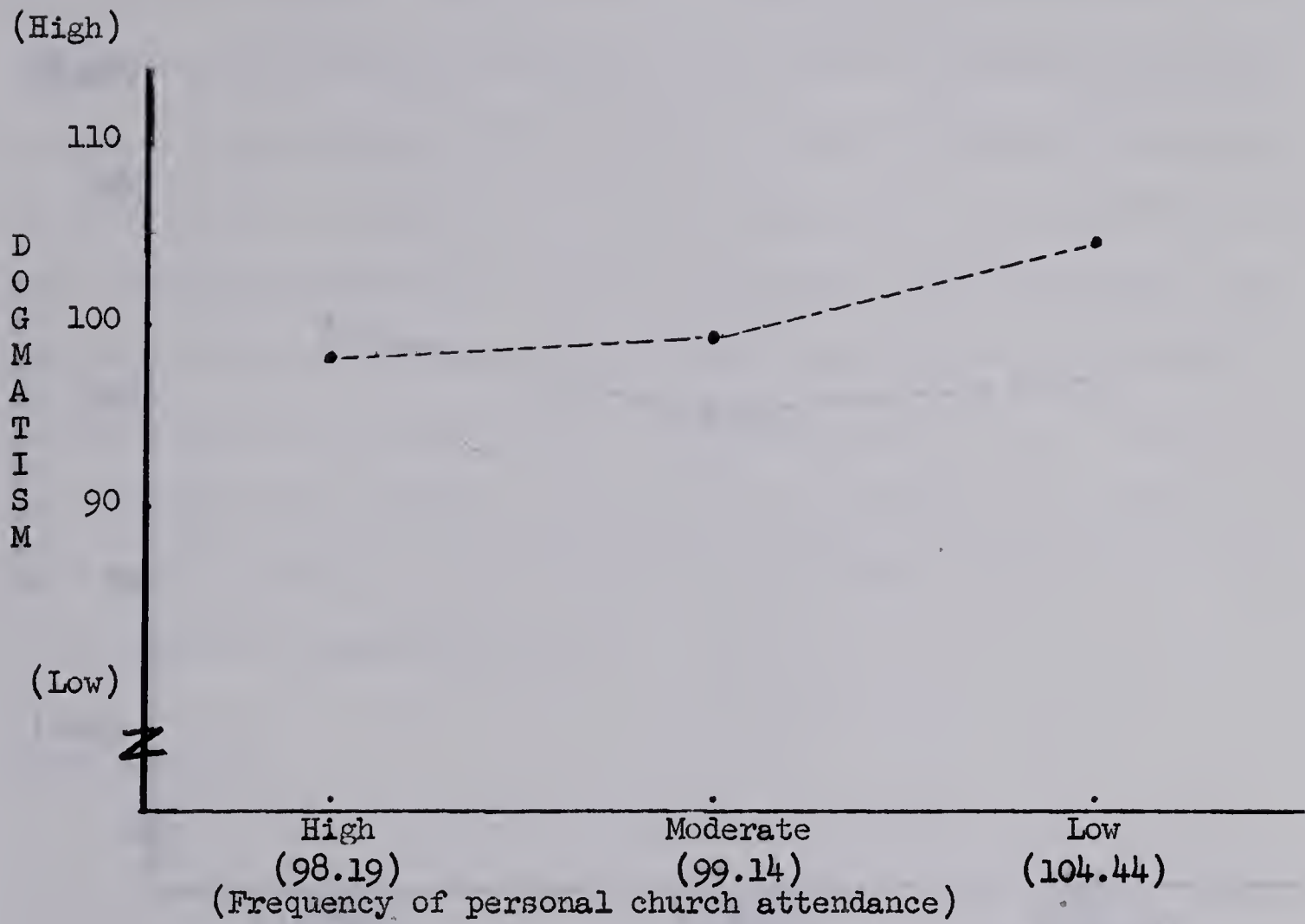
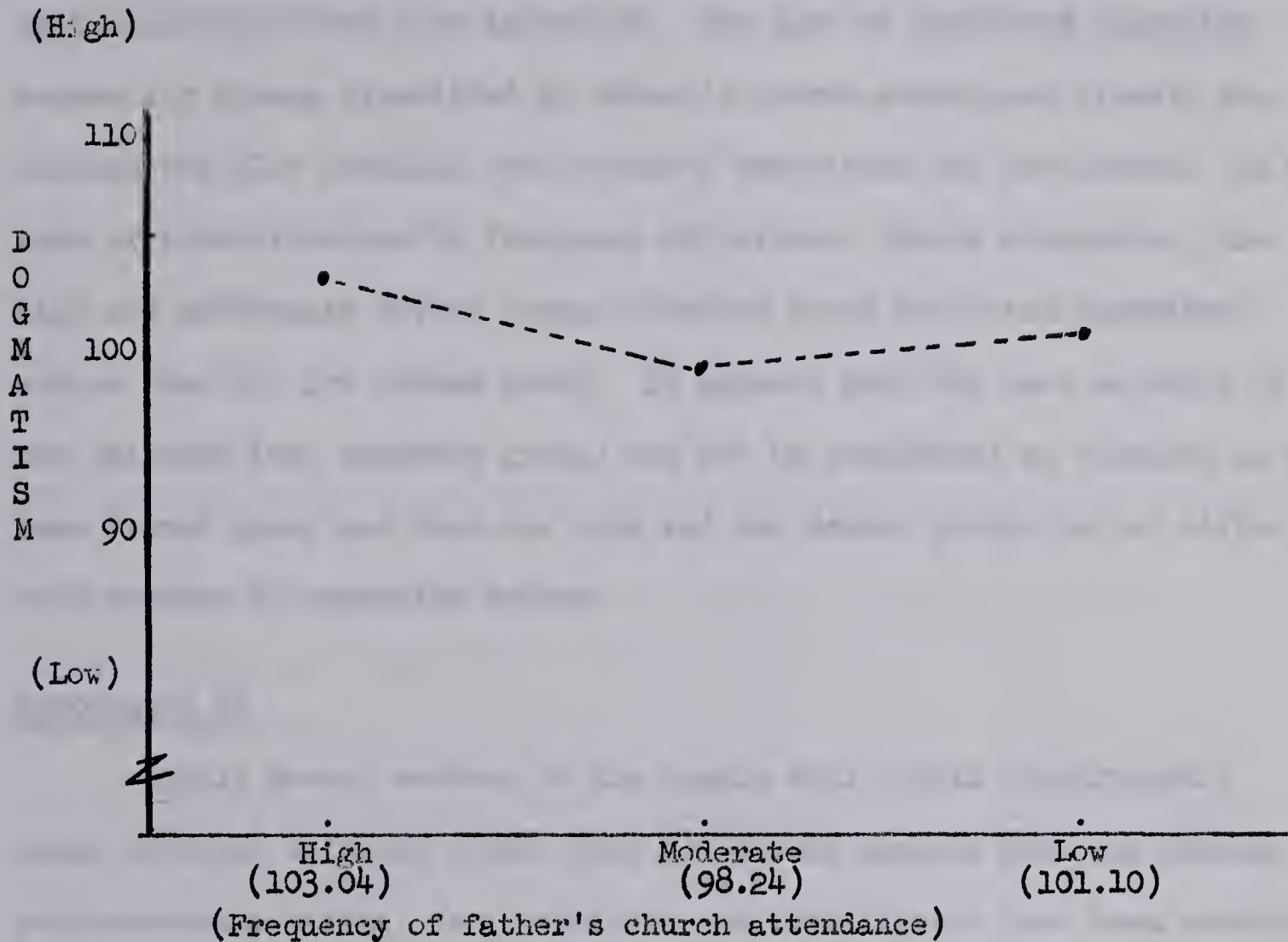






FIGURE 3

PLOT TO ILLUSTRATE ITEM THREE, DOGMATISM RELATIONSHIP



Two important findings are contained here. Firstly, the frequency of the mother's church attendance is most significantly related to dogmatism scores. The moderately devout children by this classification appear to score lower on dogmatism than the extremely high and low devout children. It is worth noting that 5.98% of the sample was classified as high devout, 66.10% as moderate, and 27.9% as low devout by responses to this item. There did not appear to be any difference between the high and low devout groups on dogmatism and the moderately devout group was least



dogmatic.

Secondly, it seems clear that dogmatism scores do not increase as devoutness increases. This is true for the three items on which devoutness classifications were inspected. The plot of predicted dogmatism scores for groups classified by father's church attendance closely resembled the plot obtained when mother's devoutness was considered. In the case of classification by frequency of personal church attendance, the high and moderately devout groups obtained lower predicted dogmatism scores than the low devout group. It appears that the vast majority of the children (the moderate group) can not be considered as dogmatic as the less devout group and that the high and low devout groups do not differ with respect to dogmatism scores.

### Hypothesis II

Highly devout members of the sample will obtain significantly lower critical thinking scores than low devout members when the effects of socio-economic status, sex, ethnicity and intelligence have been statistically controlled.





TABLE IV

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP BETWEEN  
DEVOUTNESS AND CRITICAL THINKING

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.228	.222	2/344	1.28	N.S.
2	.224	.222	2/344	0.49	N.S.
3	.234	.222	2/344	2.76	.05 < p < .10
4	.225	.222	2/344	0.62	N.S.
5	.225	.222	2/344	0.62	N.S.

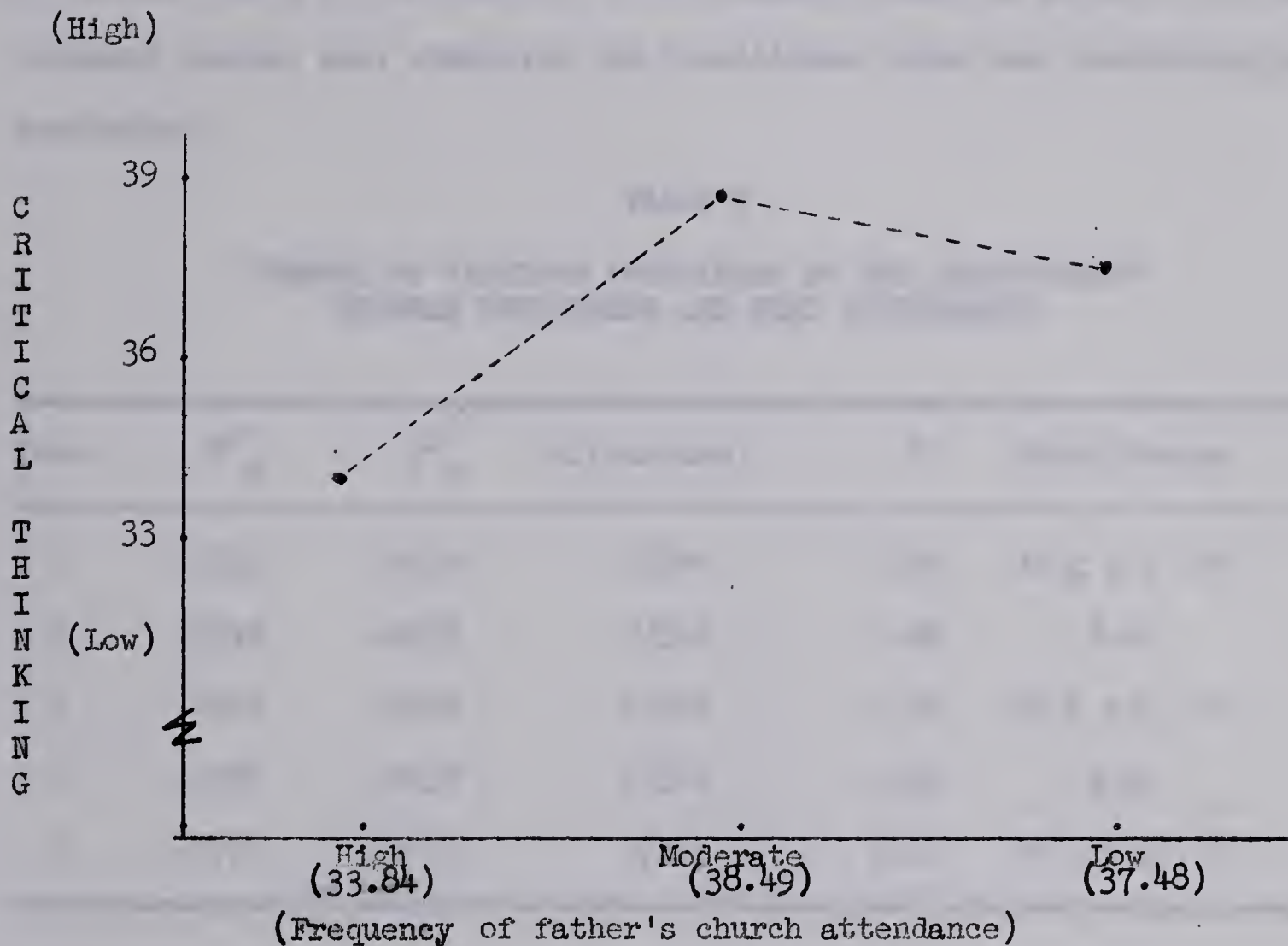
The devoutness classification by Item 3 (frequency of father's church attendance) reduced the criterion error sum of squares by an amount that was statistically significant,  $p = .07$ . Figure 4 illustrates the predicted critical thinking scores for the devoutness groups discriminated by response to this item.





FIGURE 4

PLOT TO ILLUSTRATE ITEM THREE, CRITICAL THINKING RELATIONSHIP



Once again, the relationship appears to be non-linear and the moderately devout group obtained the highest predicted critical thinking score. The high devout group obtained the lowest predicted score on critical thinking, but only 5.13% of the total sample fell into this category (52.7% moderate, 42.1% low).

Thus we might say that there was some support for the hypothesis but it should be recognized that critical thinking scores do not increase as devoutness decreases.



Hypothesis III

Highly devout members of the sample will obtain significantly lower need Achievement scores than low devout members when the effects of socioeconomic status, sex, ethnicity and intelligence have been statistically controlled.

TABLE V

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP  
BETWEEN DEVOUTNESS AND NEED ACHIEVEMENT

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.0519	.0432	2/344	1.60	.10 < p < .25
2	.0490	.0432	2/344	1.06	N.S.
3	.0607	.0432	2/344	3.24	.01 < p < .05
4	.0504	.0432	2/344	1.32	N.S.
5	.0574	.0432	2/344	2.61	.05 < p < .10

The devoutness classification by Item 3, father's church attendance, bears a highly significant relationship to the need Achievement scores. Frequency of personal prayer is also related to need Achievement scores since this devoutness classification reduced the criterion error sum of squares to the extent that such a reduction could occur by chance factors only seven times in a hundred. The plot for Item 1, frequency of personal church attendance is also included for inspection, although, once again, it is not strongly enough related to the criterion to reach conventional alpha error levels.





FIGURE 5

PLOT TO ILLUSTRATE ITEM THREE, NEED ACHIEVEMENT RELATIONSHIP

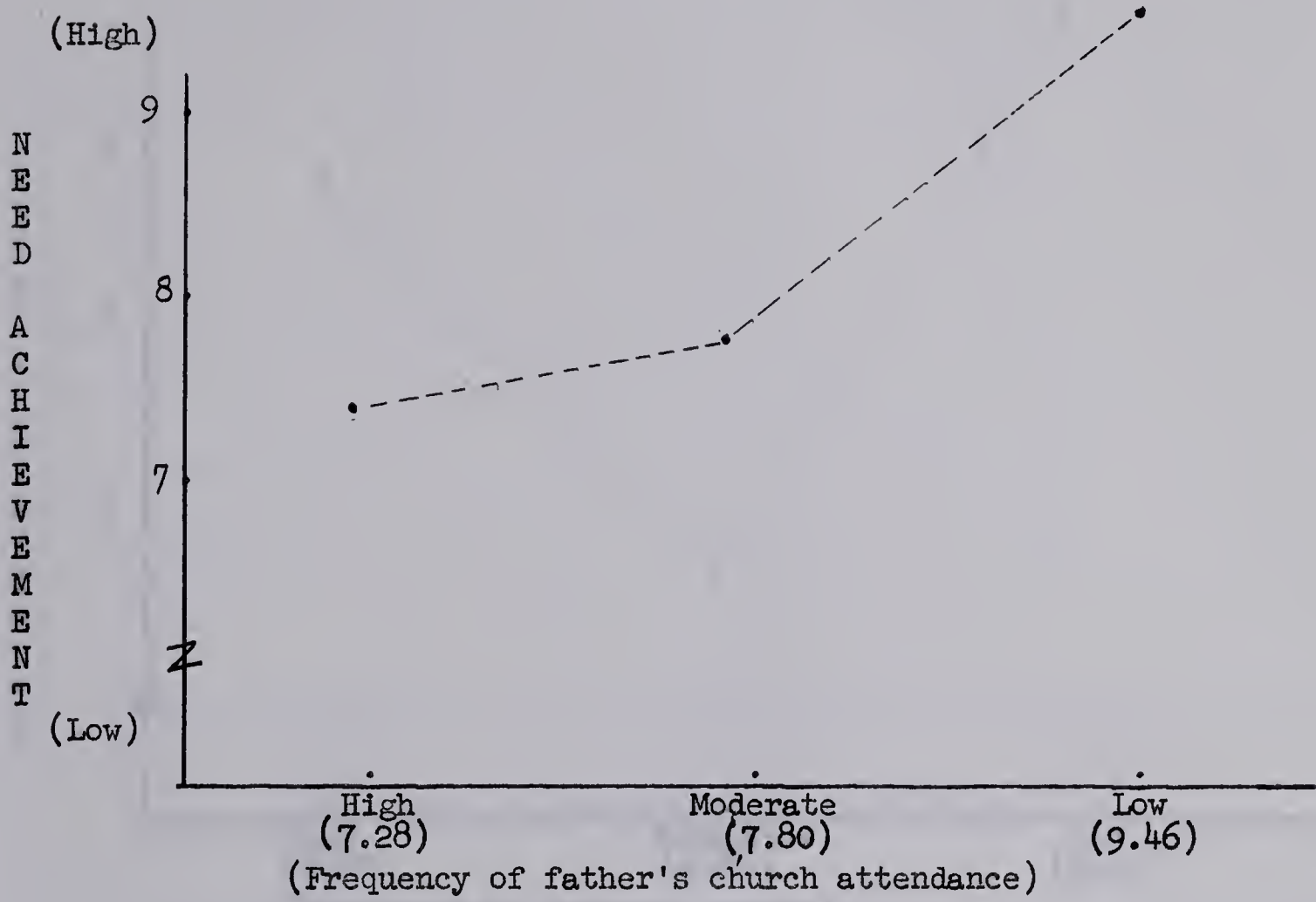






FIGURE 6

PLOT TO ILLUSTRATE ITEM FIVE, NEED ACHIEVEMENT RELATIONSHIP

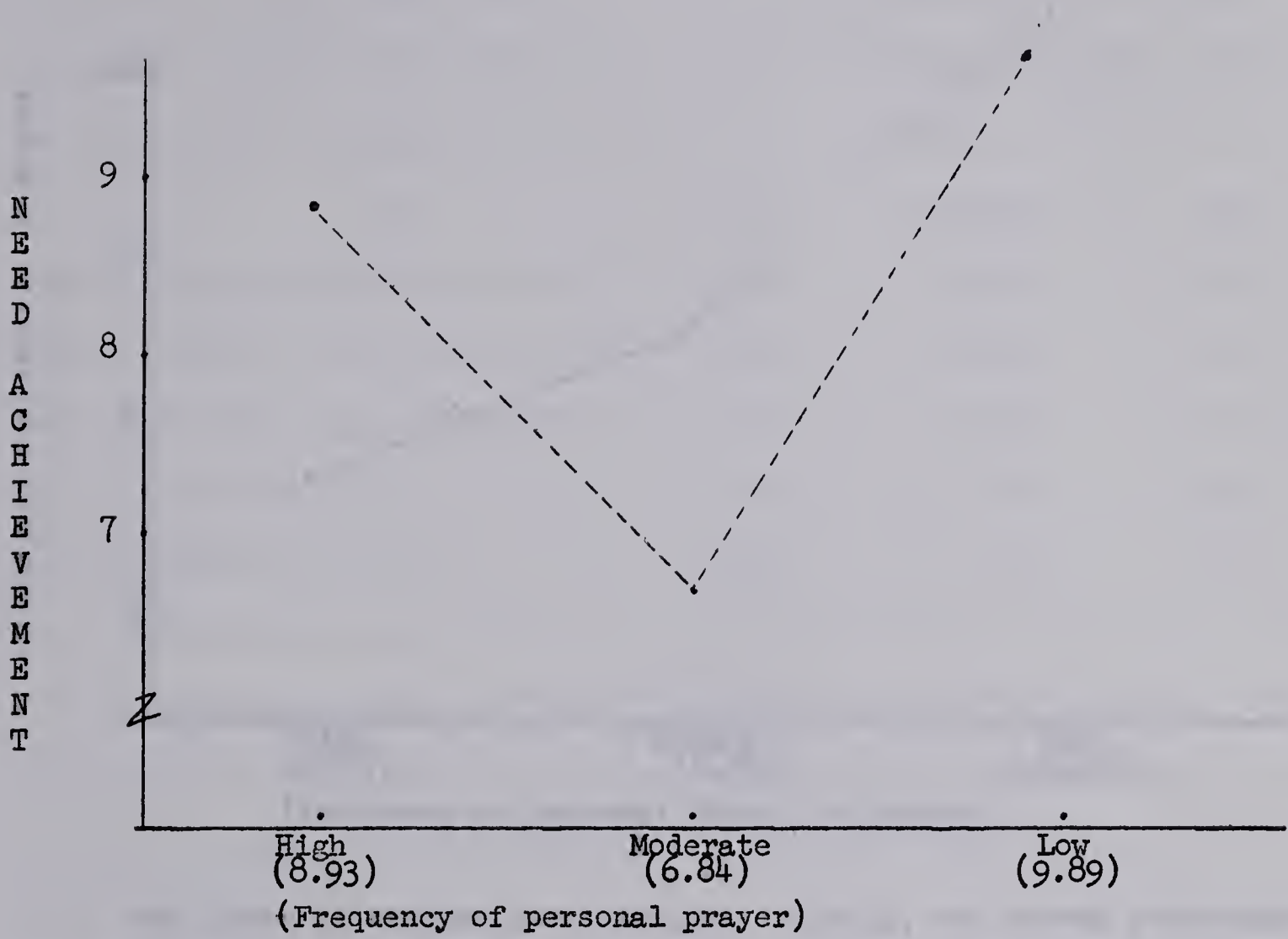
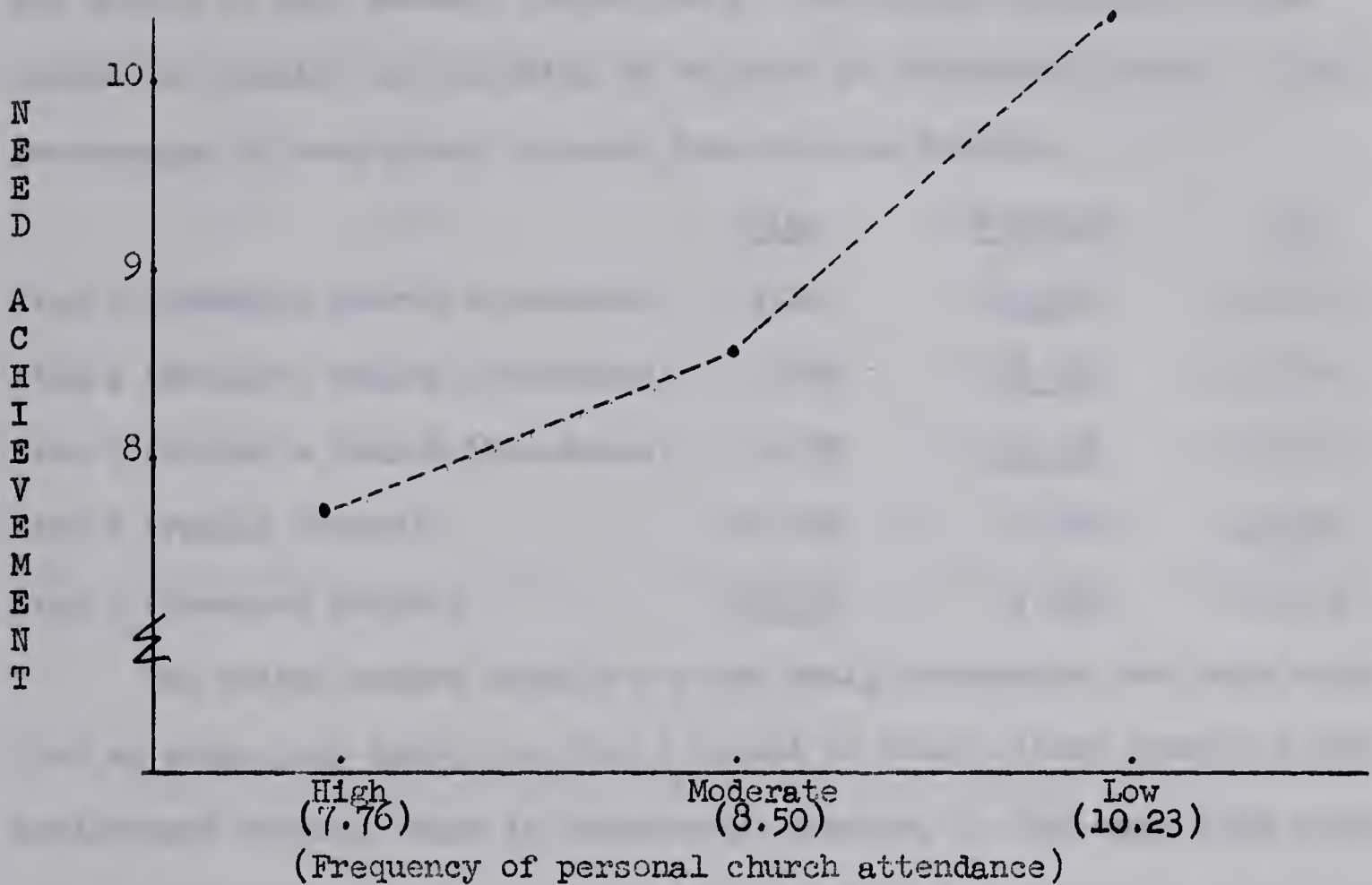




FIGURE 7

PLOT TO ILLUSTRATE ITEM ONE, NEED ACHIEVEMENT RELATIONSHIP



The plots illustrate two findings. Firstly, the church attendance measures of devoutness do bear a negative linear relationship to need Achievement scores. This was hypothesized in light of the Weberian formulations and related theory. Secondly, the prayer frequencies, for some curious reason, are not linearly related to need Achievement. The moderately devout members discriminated by this item relating to personal prayer obtained the lowest predicted need Achievement score. It is unlikely that the extreme groups differ.

An examination of the proportion falling into each devoutness classification on this item revealed that the item did not separate the





groups in the same way as the church attendance items. Items relating to frequency of family and personal prayer tended to classify subjects as non devout or very devout, respectively. The church attendance items tended to classify the majority of subjects as moderately devout. Actual percentages in each group for each item were as follows.

	<u>High</u>	<u>Moderate</u>	<u>Low</u>
Item 1 (Personal Church Attendance)	9.12%	<u>80.06%</u>	10.83%
Item 2 (Mother's Church Attendance)	5.98%	<u>66.10%</u>	27.92%
Item 3 (Father's Church Attendance)	5.13%	<u>52.71%</u>	42.16%
Item 4 (Family Prayer)	21.65%	5.70%	<u>72.65%</u>
Item 5 (Personal Prayer)	<u>80.06%</u>	7.69%	12.25%

The writer cannot explain why the small percentage who were classified as moderately devout on Item 5 tended to obtain lower predicted need Achievement scores; what is noteworthy, however, is that this item relates to need Achievement and may have value if weighted correctly in a more refined measure of devoutness.

Since the Winterbottom (1953) study which provided the psychological "missing link" for McClelland's theorizing is so relevant, the writer also considered separate analyses by sex. This was to determine whether or not the significant influence of the father's devoutness was more salient than the mother's devoutness, especially for boys. The results were surprising and are contained in Tables VI (Boys) and VII (Girls).





TABLE VI

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP BETWEEN  
DEVOUTNESS AND NEED ACHIEVEMENT AMONG BOYS IN THE SAMPLE

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.0558	.0532	2/174	.2223	N.S.
2	.0540	.0532	2/174	.0648	N.S.
3	.0597	.0532	2/174	.5590	N.S.
4	.0583	.0532	2/174	.4374	N.S.
5	.0820	.0532	2/174	2.52	.05 < p < .10

TABLE VII

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP BETWEEN  
DEVOUTNESS AND NEED ACHIEVEMENT AMONG GIRLS IN THE SAMPLE

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.0683	.0332	2/165	3.13	.01 < p < .05
2	.0532	.0332	2/165	1.75	N.S.
3	.0774	.0332	2/165	3.94	.01 < p < .05
4	.0700	.0332	2/165	3.28	.01 < p < .05
5	.0456	.0332	2/165	1.07	N.S.

It can be seen that the most significant relationships occur among the female members of the sample. This is unusual since the majority of



the research on need Achievement deals with males only. Also, the father's devoutness seems to bear a significant relationship to girls' need Achievement scores; this is an interesting finding.

The Winterbottom study of 1953 had only 29 boys between the ages of 8 - 10 as subjects. The results of that study led McClelland to hypothesize that the relationship between mother and son was crucial in the development of need Achievement in boys. One is tempted, in view of this finding and the results reported above, to view the total results in the light of the Freudian constructs of Oedipal complexes, cross-sex identification and an operant learning theory. However, this too closely resembles the playwright's "deus ex machina," which although a solution, is not usually a reasonable one. Also, the mother-son relationship was not reflected in our data as this solution would have us expect. The problem is left for others to solve.

#### Hypothesis IV

Highly devout members of the sample will obtain significantly lower aesthetic interest scores than low devout subjects when the effects of sex, socioeconomic status, ethnicity and intelligence have been statistically controlled.





TABLE VIII

SUMMARY OF FINDINGS PERTAINING TO THE RELATIONSHIP  
BETWEEN DEVOUTNESS AND AESTHETIC INTEREST

Item	$R^2_u$	$R^2_r$	df(num/den)	F	Significance
1	.2384	.2368	2/344	0.35	N.S.
2	.2424	.2368	2/344	1.27	N.S.
3	.2373	.2368	2/344	0.10	N.S.
4	.2371	.2368	2/344	0.06	N.S.
5	.2399	.2368	2/344	0.70	N.S.

Devoutness, as measured in this study, is obviously unrelated to aesthetic interest scores among the Grade VIII students who comprised the sample.

#### Hypothesis V

On the basis of the theory used to order the apparently unrelated phenomena with which this study is concerned, it is hypothesized that a principal axis factor analysis of the intercorrelations among the dependent variables will show a general, bipolar factor on which need Achievement, critical thinking and aesthetic interest load in one direction and dogmatism in the opposite direction.





TABLE IX

INTERCORRELATION AMONG DEPENDENT VARIABLES FOR TOTAL GROUP<sup>(1) (2)</sup>

	1	2	3	4
Dogmatism	(.533)	-.143	-.029	.130
Critical Thinking	-.143	(.443)	.257	-.125
Need Achievement	-.029	.257	(.409)	-.041
Aesthetic Interest	.130	-.125	-.041	(.259)

<sup>(1)</sup>N = 351,  $r = .105$  is significant at  $\alpha = .05$ <sup>(2)</sup>Diagonal elements are communality estimates obtained by successive refactoring used in factor analysis

TABLE X

INTERCORRELATIONS AMONG DEPENDENT VARIABLES FOR MALES<sup>(1) (2)</sup>

	1	2	3	4
Dogmatism	(.778)	-.060	.057	.076
Critical Thinking	-.060	(.467)	.327	-.226
Need Achievement	.057	.327	(.452)	-.117
Aesthetic Interest	.076	-.226	-.117	(.166)

<sup>(1)</sup>N = 180,  $r = .145$  is significant at  $\alpha = .05$ <sup>(2)</sup>Diagonal elements are communality estimates obtained by successive refactoring used in factor analysis



TABLE XI  
INTERCORRELATIONS AMONG DEPENDENT VARIABLES FOR FEMALES<sup>(1) (2)</sup>

	1	2	3	4
Dogmatism	(.341)	-.205	-.113	.140
Critical Thinking	-.205	(.421)	.191	.030
Need Achievement	-.113	.191	(.200)	.002
Aesthetic Interest	.140	.030	.002	(.759)

(1) N = 171,  $r = .150$  is significant at  $\alpha = .05$

(2) Diagonal elements are communality estimates obtained by successive refactoring used in factor analysis

The correlations indicate that the directionality of the relationships was correctly predicted except for aesthetic interest. However, the magnitude of the correlations is so low as to be of theoretical interest only. Statistically, however, the results are supportive and despite marginal utility, tend to indicate that the hypothesized relationships do exist. The aesthetic interest scores do not relate to scores on the other dependent variables as predicted.





TABLE XII

## UNROTATED PRINCIPAL AXIS FACTORS FOR TOTAL, MALE AND FEMALE GROUPS

TOTAL		MALES		FEMALES	
I	II	I	II	I	II
-.467	532	-.288	831	-.338	-.349
.576	197	.639	136	.166	.586
.431	389	.537	279	.110	.326
-.272	125	-.320	-.001	-.811	.306

TOTAL GROUP: Factor 1 accounts for  $\frac{.81}{1.644}$  (49.2%) of the total variance

MALE GROUP: Factor 1 accounts for  $\frac{.88}{1.863}$  (47.2%) of the total variance

FEMALE GROUP: Factor 1 accounts for  $\frac{.81}{1.72}$  (47.1%) of the total variance

These results confirm the statements made above. The directionality of the test loadings on the first factor was correctly predicted with the exception of aesthetic interest. We conclude that the data gave partial support for this hypothesis; no explanation is offered for the tendency for aesthetic interest scores to correlate with the other variables in directions opposite to those hypothesized.





## CHAPTER VII

### CONCLUSIONS AND IMPLICATIONS

#### I CONCLUSIONS

This study concerned itself with differences on four dimensions and investigated the relationship between performance on these dimensions and religious devoutness. It is not possible to determine any inter-denominational differences from this study; however, the present effort certainly provides some valuable insights which merit careful consideration in planning research in this area and in formulating conclusions derived from related research.

The most relevant conclusion is that curvilinearity characterizes many relationships between devoutness and scores on dogmatism, need Achievement, critical thinking and aesthetic values preference. In an initial data analysis, the writer used a continuous measure of devoutness rather than a categorical one. Theoretical considerations indicated that, most probably, linear relationships existed between devoutness and scores on the four dependent variables. Hence it was concluded that the continuous measure of devoutness would be applicable. When the data were analyzed in this manner, not only were three of the comparisons not close to statistical significance, but one (critical thinking) flatly contradicted other findings which were derived from well conducted studies. When categorical information was used, the reasons for this oddity became clearer. In almost every case some curvilinearity was evident; this in-



formation was lost when the continuous measure of devoutness was used because the multiple regression analysis considered only the linearity of the relationships. A graphical illustration should clarify the discussion (Figure 8).

FIGURE 8

HYPOTHETICAL SCATTER DIAGRAM TO ILLUSTRATE INFORMATION  
LOSS IN THE LINEAR MODEL WHEN CONTINUOUS DEVOUTNESS  
SCORES USED TO PREDICT CRITERION

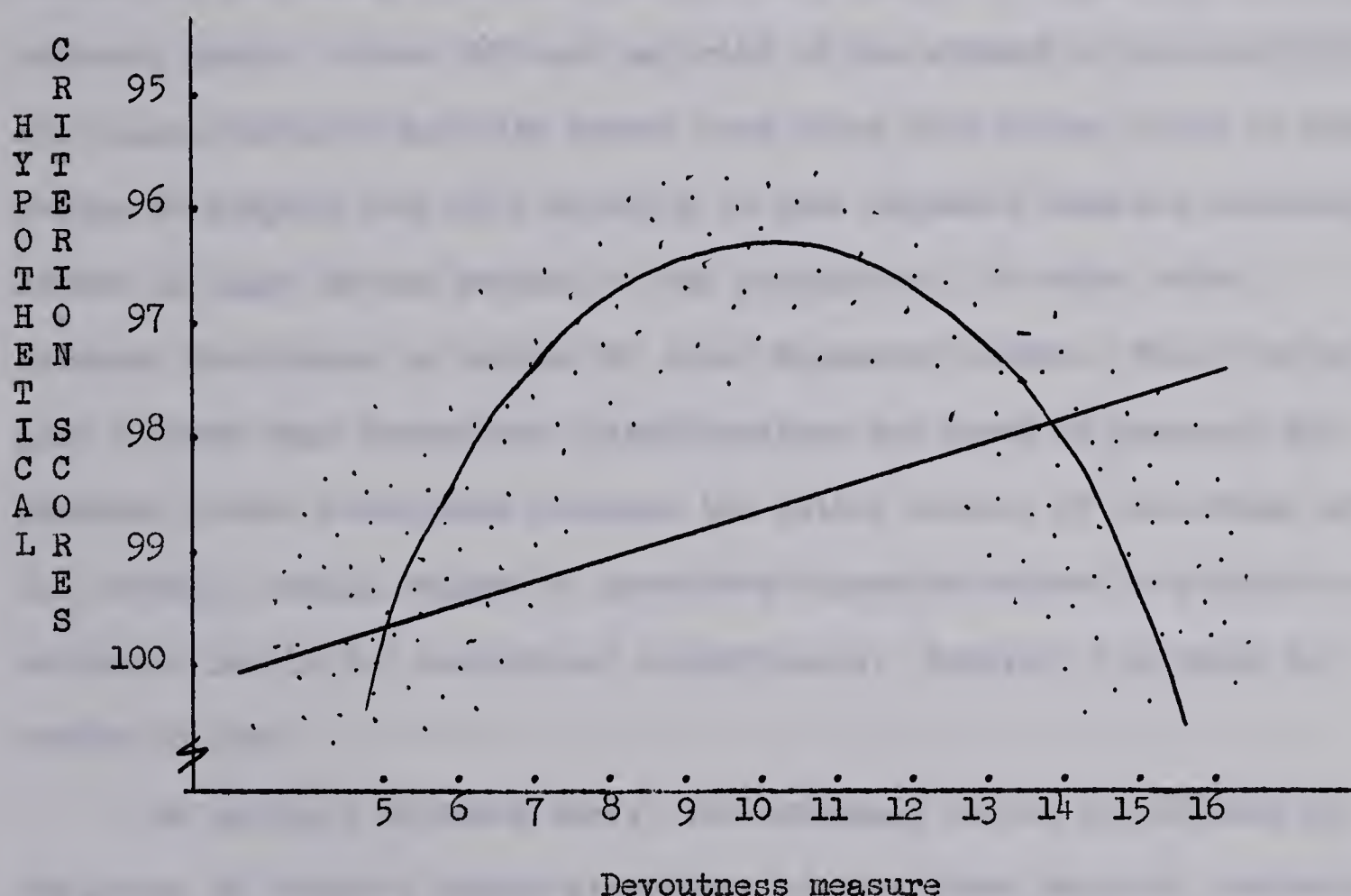


Figure 8 represents a hypothetical case which is analogous to the devoutness - dogmatism relationship. When a continuous measure of devoutness is used, the devoutness - criterion relationship, when expressed by a linear model, indicates that criterion scores tend to decrease as





devoutness increases. The fact that the moderately devout group is really lower on the criterion than the two extreme groups is hidden because of the type of analysis used.

It appears incorrect to assume a positive linear relationship between devoutness and dogmatism, at least in this sample of Grade VIII students. The moderately devout group as classified by frequency of mother's church attendance are least dogmatic while the extreme groups, though not differing from each other, score higher on dogmatism than the moderate group. Since the vast majority of the student population (68%) are classified as moderately devout when using this index, there is every reason to suspect that this majority is less dogmatic than the extremely devout or least devout members of the population. In other words, moderate devoutness is related to lower dogmatism scores. This finding is also evident when devoutness classifications are based on personal and paternal church attendance although the latter indices of devoutness are not strongly enough related to predicted dogmatism scores to attain conventional levels for statistical significance. However, the trend is worthy of note.

On critical thinking tests, the extremely devout as measured by frequency of father's church attendance, scored lower than the moderately devout and low devout members. This was as predicted, but the difference between moderately and low devout subjects on critical thinking was insignificant and favored the moderate group.

Predicted need Achievement scores indicated that the extremely devout as measured by frequency of father's church attendance, scored





lower than the moderately and low devout. This was the one instance where there appeared to be a direct linear relationship with devoutness.

Separate analyses by sex showed that females' need Achievement scores were most significantly related to the father's frequency of church attendance as well as the frequency of personal church attendance.

On aesthetic values preference, the moderately devout subjects classified by mother's church attendance (the least dogmatic group) showed less preference for the aesthetic than did the high and low devout subjects classified on the same item. This finding was the most unexpected since it contradicted the theory to some extent.<sup>1</sup> Apart from this exception, the relatedness hypothesized to exist between the dependent variables, independent of devoutness, was substantiated by the correlational and factor analyses. It may well be that the positive relationship between dogmatism and aesthetic interest is peculiar to this age group. This remains to be studied.

The general conclusion to be drawn from these findings is that intra-denominational moderate devoutness as measured (primarily) by frequency of church attendance, appears to be favorably related to need Achievement, critical thinking and dogmatism. Extremely high devoutness is related to these variables in predicted directions but appears to be positively related to preference for the aesthetic, a finding not anticipated or predicted by the writer.

Quite clearly, then, it seems that within Catholicism, average devoutness is not a handicap but an asset insofar as this variable relates to dogmatism, need Achievement and critical thinking. The same

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<sup>1</sup>This discussion is for the interested reader; findings pertaining to aesthetic interest were not statistically significant.





cannot be said for extreme devoutness. However, since so few of the population can be considered extremely devout using the church attendance frequency measures, we conclude that the average Catholic does not labour under any disadvantages of which his more or less devout Catholic brethren are free. In fact, the situation may be reversed.

## II IMPLICATIONS

For the educator and social psychologist there are some pertinent ideas to be derived from this study.

The fact that there can be a significant reduction in the error sum of squares by using a "devoutness" vector in multiple regression analysis is important in itself. Perhaps more important is that the trend for curvilinear patterns to appear in the data analysis is worth careful investigation. It is not unlikely that inaccurate generalizations will continue to be made until the findings of this study are replicated by others.

Further refinement and articulation of behavioral measures of devoutness is another area worthy of detailed study. The devoutness measures considered in this study, although mere frequency of church attendance counts, are related to the dependent variables considered. This type of measure is valuable for its objectivity and simplicity; little, if any, confusion can arise in the respondent as a consequence of item structure or meaning. This kind of objectivity is desirable and leaves scope for improvement.

It is interesting to note that the father's devoutness appears to





be related to critical thinking and need Achievement whereas the mother's devoutness is most significantly related to dogmatism and aesthetic interest. This differentiation of influences presents another area for further investigation. This writer would suggest consideration of one variable at a time; in this way a thorough study of each dependent variable could be accomplished by a graduate student.

Another study or series of studies which would illuminate the applicability of these findings to other denominations could be undertaken. The question of whether devoutness is related to the four dependent variables in a similar manner when denomination is varied is yet to be answered. Similarly, one might be interested in inter-denominational differences. If this is the case, the present writer would advocate consideration of devoutness as a relevant variable when making any comparisons of means.

What appears to be a significant study remains to be done in the area of critical or analytical thinking. It will be recalled that the present study found moderate devoutness as measured by frequency of paternal church attendance, to be most favorably related to predicted critical thinking scores. This was unexpected. However, the writer recalls that Rokeach (1960) encountered a somewhat similar phenomenon and had difficulty demonstrating that closed systems are poorer in analysis. He remarked:

At this point, the reader may raise the following question. In view of the fact that open and closed groups are not equated for rigidity, and in view of the fact that there is a positive correlation around .45 between dogmatism and rigidity, why do not the open and closed groups differ in analysis as well as in

is included in the list of countries which are not members of the Organization for Security and Co-operation in Europe. The Government of the United Kingdom has been asked to consider the possibility of extending the list to include the countries of the Eastern Hemisphere. It is suggested that the list should be extended to include the countries of the Eastern Hemisphere, and that the list should be extended to include the countries of the Eastern Hemisphere.

Further steps are being taken to ensure that the list is extended to include the countries of the Eastern Hemisphere. It is suggested that the list should be extended to include the countries of the Eastern Hemisphere, and that the list should be extended to include the countries of the Eastern Hemisphere. The question of extending the list to include the countries of the Eastern Hemisphere is being considered by the Government of the United Kingdom. It is suggested that the list should be extended to include the countries of the Eastern Hemisphere, and that the list should be extended to include the countries of the Eastern Hemisphere.

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At the same time, the Government of the United Kingdom has been asked to consider the possibility of extending the list to include the countries of the Eastern Hemisphere. It is suggested that the list should be extended to include the countries of the Eastern Hemisphere, and that the list should be extended to include the countries of the Eastern Hemisphere. The question of extending the list to include the countries of the Eastern Hemisphere is being considered by the Government of the United Kingdom. It is suggested that the list should be extended to include the countries of the Eastern Hemisphere, and that the list should be extended to include the countries of the Eastern Hemisphere.



synthesis? We must confess that we are not completely clear on the answer to this question. It seems reasonable to expect that open and closed groups should also differ in analysis. Looking back at all the analysis data presented in Chapters 9, 10 and 11, we note that the closed groups are consistently poorer in analysis but that the differences are slight and never reach statistical significance. The consistent trends are in line with theoretical expectations. That these trends are not statistically significant is not in line with theoretical expectations. (notes, p. 242)

It appears to the present writer that a significant contribution might be made if this problem was investigated. It remains to be answered satisfactorily and the independent variable need not be devoutness but closedness or dogmatism. The latter measure might prove easier to obtain since school administrative personnel are more favorably disposed to non-religious measures.

The final suggestion to be made pertains to sampling procedure. It should be recognized that, at present, one is likely to encounter some difficulty in obtaining a proper sample for his work. The writer advocates careful consideration of this aspect of research before any detailed and prolonged effort is expended. It may be for naught unless one is assured early in his study that a proper sample will be available.



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The pictures used for the four stories in this study were B, H, A, and G (standard letters used by McClelland et al. (1953) in identifying each picture) in that order. A description of the pictures classified by their identifying letter is as follows:

- A. "Father-son". Card 7BM from the Murray Thematic Apperception Test.
- B. Two men (inventors) in a shop working at a machine.
- G. Boy with vague operation scene in background. Card 8BM from the Murray Thematic Apperception Test.
- H. Boy in checked shirt at a desk, an open text book in front of him.

In recording these stories a separate paragraph was used for the responses to each of the four questions that were asked in order to insure complete coverage of a plot. The four sets of questions were:

1. What is happening? Who are the persons?
2. What has led up to this situation - that is what has happened in the past?
3. What is being thought - what is wanted? By whom?
4. What will happen? What will be done?

The instructions to the students were as follows:

This is a test of your creative imagination. A number of pictures will be projected on the screen before you. You will have twenty seconds to look at the pictures and then about four minutes to make up a story about it. Notice that there is one page for each picture. The same four questions are asked. They will guide your thinking and enable you to cover all the elements of a plot in the time allotted. Plan to spend





about a minute on each question. I will keep time and tell you when it is time to go on to the next question for each story. You will have a little time to finish each story before the next picture is shown.

Obviously there are no right or wrong answers, so you may feel free to make up any kind of a story about the pictures you choose. Try to make them vivid and dramatic for this is a test of creative imagination. Do not merely describe the picture you see. Tell a story about it. Work as fast as you can in order to finish in time. Make them interesting. Are there any questions? If you need more space for any question, use the reverse side.

The room was then darkened for 20 seconds while the first picture was projected on a screen before the subjects. After 20 seconds the picture was turned off, the lights were turned on and the subjects began writing. The experimenter kept time and after a minute had been allowed for each question, would say, "All right, it is about time to go on to the next question." When the subjects had been writing for 30 seconds on the last question, the experimenter would say, "Try to finish up in 30 seconds." At the end of the final minute he would begin to prepare for the next picture, allowing about 15 - 20 seconds over the required time for finishing the stories. The lights would be dimmed and the next picture projected on the screen for 20 seconds, and so on without interruption until all four stories had been written.





# SUMMARY OF GROUP PERFORMANCE ON NEED ACHIEVEMENT<sup>1</sup>

	<u>TOTAL</u>	<u>MALES</u>	<u>FEMALES</u>
$\bar{X}$	5.376	5.244	5.515
Sx	6.298	6.376	6.212
N	351	180	171

<sup>1</sup>Scores here expressed in raw form. To obtain comparable scores for relating to plots, add a constant of +4, i.e., the transformed mean for the total group is 9.376, etc. The standard deviation remains unchanged by addition of a constant.

## Reliability

(a) Scorer: Inter-rater reliabilities are generally quite high for the need Achievement test (Wahlstrom, 1965). Coefficients range from .75 to .96 with the average being around .90. Wahlstrom's coefficient was .91. A sample of 40 protocols was scored by an independent scorer in the present study. The correlation between scores was an acceptable .88.

(b) Retest: McClelland (1953, pp. 190-191) reports a coefficient of .64 for two sets of three pictures each, administered at the same time. Wahlstrom (1965) has reported that retest reliability coefficients are generally very low, (.20 to .60) although indirect evidence for reliability comes from findings that n Achievement scores are related to other behaviors.



# Appendix A

1. The following statements are true for the majority of people. Indicate your level of agreement with each statement. (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree)

- (1) I agree with the statement.
- (2) I disagree with the statement.
- (3) I am not sure about the statement.
- (4) I strongly agree with the statement.
- (5) I strongly disagree with the statement.

2. The following statements are true for the majority of people. Indicate your level of agreement with each statement. (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree)

## APPENDIX B

### DOGMATISM SCALE

- 1. The following are true for the majority of people. (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree)
- 2. I believe in the majority of people, and I will not consider anyone who does not.
- 3. The majority of people are not as intelligent as I am.
- 4. I believe in the majority of people, and I will not consider anyone who does not.
- 5. I believe in the majority of people, and I will not consider anyone who does not.
- 6. I believe in the majority of people, and I will not consider anyone who does not.
- 7. I believe in the majority of people, and I will not consider anyone who does not.
- 8. I believe in the majority of people, and I will not consider anyone who does not.
- 9. I believe in the majority of people, and I will not consider anyone who does not.
- 10. I believe in the majority of people, and I will not consider anyone who does not.
- 11. I believe in the majority of people, and I will not consider anyone who does not.
- 12. I believe in the majority of people, and I will not consider anyone who does not.
- 13. I believe in the majority of people, and I will not consider anyone who does not.
- 14. I believe in the majority of people, and I will not consider anyone who does not.
- 15. I believe in the majority of people, and I will not consider anyone who does not.





## OPINIONS

I am going to read, with you, the statements below. Sometimes you will agree with the statements, other times you will disagree. You are to mark your opinion on the left side of the page in the space provided.

There are six ways you can answer:

- |                           |                              |
|---------------------------|------------------------------|
| +1: I agree a little.     | -1: I disagree a little.     |
| +2: I agree on the whole. | -2: I disagree on the whole. |
| +3: I agree very much.    | -3: I disagree very much.    |

So, all you have to do is select the number of the answer that is right for you and put that number in the space in front of the question or statement.

Questions????

- \_\_\_ a. It is only natural for a person to have a guilty conscience.
- \_\_\_ b. The highest and best type of government is a democracy run by those who are most intelligent.
- \_\_\_ c. I believe in free speech, but not for everybody in our society.
- \_\_\_ d. Man on his own is a helpless and miserable creature.
- \_\_\_ e. It is better to be a dead hero than a live coward.
- \_\_\_ f. Most of the people I talk to don't understand what's going on around them.
- \_\_\_ g. I have come to hate some people because of the things they stand for.
- \_\_\_ h. I get mad when a person stubbornly refuses to admit he's wrong.
- \_\_\_ i. Really the world we live in is a pretty lonesome place.
- \_\_\_ j. It is only natural for a person to be rather fearful of the future.
- \_\_\_ k. Most people just don't know what's good for them.
- \_\_\_ l. You can't put up with differences of opinion among group members.
- \_\_\_ m. I can't stand a person who thinks first of his or her own happiness.





- \_\_\_ n. A man who doesn't believe in some great cause or ideas has not really lived.
- \_\_\_ o. I'd like to find someone who could tell me how to solve my personal problems.
- \_\_\_ p. If given the chance, I would like to do something of great benefit to the world.
- \_\_\_ q. The present is full of unhappiness. It is only the future that counts.
- \_\_\_ r. Most people just don't care at all about others.
- \_\_\_ s. Of all the ideas that exist, probably only one is right.
- \_\_\_ t. The main thing in life is for a person to want to do something important.
- \_\_\_ u. Once I get wound up in a heated discussion, I just can't stop.
- \_\_\_ v. We must be careful not go get too friendly with people who have different religious beliefs than us.
- \_\_\_ w. The world is so complicated nowadays that the only way we can know what is going on is to rely on leaders or experts who can be trusted.
- \_\_\_ x. There are two kinds of people in this world; those who are for truth and those who are against truth.
- \_\_\_ y. In a heated discussion I generally become so interested in what I am going to say that I forget to listen to what the others are saying.



## SUMMARY OF RESULTS ON THE DOGMATISM SCALE

	<u>TOTAL</u>	<u>MALES</u>	<u>FEMALES</u>
$\bar{X}$	100.664	99.517	101.871
Sx	16.986	15.699	18.165
N	351	180	171

Reliability

Rokeach (1960) obtained split half and test-retest reliability coefficients ranging from .70 to .93. It seems reasonable to assume that the test is sufficiently reliable to be considered a useful instrument.





## Appendix B

Appendix B contains a list of the most commonly used critical thinking tests. These tests are designed to assess a person's ability to think critically. The tests are divided into two categories: verbal and non-verbal. The verbal tests are designed to assess a person's ability to understand and use language. The non-verbal tests are designed to assess a person's ability to understand and use visual information.

The verbal tests are divided into two categories: reading comprehension and logical reasoning. The non-verbal tests are divided into two categories: spatial reasoning and abstract reasoning.

The reading comprehension tests are designed to assess a person's ability to understand and use language. The logical reasoning tests are designed to assess a person's ability to understand and use logic.

The spatial reasoning tests are designed to assess a person's ability to understand and use visual information. The abstract reasoning tests are designed to assess a person's ability to understand and use abstract concepts.

The spatial reasoning tests are divided into two categories: spatial visualization and spatial reasoning. The abstract reasoning tests are divided into two categories: abstract reasoning and abstract visualization.

The spatial visualization tests are designed to assess a person's ability to visualize spatial relationships. The spatial reasoning tests are designed to assess a person's ability to reason about spatial relationships.

The abstract reasoning tests are designed to assess a person's ability to reason about abstract concepts. The abstract visualization tests are designed to assess a person's ability to visualize abstract concepts.

The abstract reasoning tests are divided into two categories: abstract reasoning and abstract visualization. The abstract visualization tests are designed to assess a person's ability to visualize abstract concepts.

The abstract reasoning tests are designed to assess a person's ability to reason about abstract concepts. The abstract visualization tests are designed to assess a person's ability to visualize abstract concepts.

The abstract reasoning tests are designed to assess a person's ability to reason about abstract concepts. The abstract visualization tests are designed to assess a person's ability to visualize abstract concepts.

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The abstract reasoning tests are designed to assess a person's ability to reason about abstract concepts. The abstract visualization tests are designed to assess a person's ability to visualize abstract concepts.





### THE RENSION TEST

Directions: This is a test to see how well you can judge statements based upon facts which are presented to you. In some cases you can tell from the facts given that a statement is false or true. In other cases you can say that the statement is probably false or true because the facts suggest this is so but do not make it certain. There are still other cases where you are not given enough facts to make it possible for you to say anything about the truth or falsity of the statement.

If you can tell from the facts that a statement is true, mark T with an X.

If you can tell from the facts that a statement is false, mark F with an X.

If the facts suggest that a statement is true but do not make it certain, it is probably true. Mark PT with an X.

If the facts suggest that a statement is false but do not make it certain, it is probably false. Mark PF with an X.

If there are not enough facts given to make it possible for you to say anything about the truth or falsity of the statement, mark NE with an X

EXAMPLE: A brother and sister raised tulips to enter in the annual flower show. Some bulbs were planted in loam and some in clay. The tulips were tended with care and all bloomed in time for the flower show. The tulips which had grown in loam won the prize.

~~T~~ PT NE PF F 1. The flower show was held once a year.  
(True. The paragraph tells it was an annual flower show)

T ~~PT~~ NE PF F 2. Plants grow well in loam.  
(Probably true. Tulips grew well and tulips are plants, so .....)

T PT NE PF ~~X~~ 3. All of the bulbs were planted in loam.  
(False. The paragraph tells that some bulbs were planted in clay.)

T PT ~~NE~~ PF F 4. Tulips grow better in loam than in any other kind of soil.  
(Not enough facts given. The paragraph tells about only two kinds of soil, loam and clay. It does not tell about other kinds of soil.)

P PT BE ~~PF~~ F 5. If the brother and sister raise tulips next year, they will not plant any in loam.  
(Probably false. The paragraph tells that the tulips which grew in the loam won the prize. We would judge from this that they would probably try loam again.)

So, you have five possible answers to each question:

T = True; PT = Probably True; F = False; PF = Probably False;  
NE = Not enough Facts

ARE THERE ANY QUESTIONS? IF NOT, LET'S TURN THE PAGE AND BEGIN TOGETHER  
WHEN I GIVE THE SIGNAL.





## I

Although your chance of being struck by lightning is very, very small, this small chance is something to think about. If you are out in the open when a thunder storm begins, you should stay away from trees, high places, and wire fences, because these are in the greatest danger of being struck by lightning. If there is a building near, go inside and keep dry.

- T PT NE PF F 1. You will not be struck by lightning if you stay inside a building during a thunder storm.
- T PT NE PF F 2. A tree on top of a hill is more likely to be struck by lightning than a tree in a valley.
- T PT NE PF F 3. Within your lifetime you will not be struck by lightning.
- T PT NE PF F 4. If there is no building near when a thunder storm begins, you should go under a tree to keep dry.
- T PT NE PF F 5. A farmer should not leave a cow tied to a wire fence during a thunder storm.
- T PT NE PF F 6. Lightning never strikes twice in the same place.
- T PT NE PF F 7. Lightning will strike whom it will, and there is nothing than can be done about it.

## II

Cement has been used for buildings for thousands of years. Romans of long ago used it for making roads and walls of buildings. Many of the walls are still standing, and some of the roads made by the Romans 2000 years ago are still used today.

Wear, weather, and changing temperatures are hard on cement, yet well-made cement can last for ages.

- T PT NE PF F 1. Some of the old Roman roads are still in use.
- T PT NE PF F 2. If the winters of Rome were more severe, the cement roads would not have lasted so well.
- T PT NE PF F 3. The oldest things are the best.
- T PT NE PF F 4. Some important Roman roads were not used for centuries.
- T PT NE PF F 5. The Romans have never been thought to be good builders.





- T PT NE PF F 6. Cement was discovered by an American scientist.
- T PT NE PF F 7. Some of the Roman roads have been in use for more than 2000 years.

### III

There are many kinds of storms. Some storms are destructive, but most storms are very useful. They help to circulate the air. They bring rain. They clear the air of soot, smoke and dirt.

- T PT NE PF F 1. Some storms do great damage.
- T PT NE PF F 2. There is some good in every evil.
- T PT NE PF F 3. The oldest things are the best.
- T PT NE PF F 4. Storms are more often destructive than useful.
- T PT NE PF F 5. The next storm to pass through your neighbourhood will be a destructive one.
- T PT NE PF F 6. If it weren't for storms, this world would not be such a pleasant place to live.

### IV

There is more carbon in hard coal than in soft coal. Hard coal burns with almost no smoke and leaves very few ashes. Soft coal makes a lot of smoke and soot when it burns. Many large factories burn soft coal because it is cheap and plentiful.

- T PT NE PF F 1. People like to live near factories that burn soft coal.
- T PT NE PF F 2. The more carbon there is in coal, the more smoke it makes when it burns.
- T PT BE PF F 3. Factory owners care nothing about the health of the people that live near the factories.
- T PT NE PF F 4. Factory owners would like to use hard coal.
- T PT NE PF F 5. Soft coal is cheaper than hard coal.

PLEASE DO NOT TURN THE PAGE UNTIL THE SIGNAL IS GIVEN.





**DIRECTIONS:** You are going to be given some problems. Some of these problems can't be solved because certain necessary information is missing. You are to read the problem, and then decide if any other fact is needed before you could solve it. If more information is needed, write down exactly what fact or facts are needed. Write this on the blank underneath the problem.

SAMPLE A: A person spent \$3.75 while out shopping. How much money did he have left?

(How much money did he have in the beginning????)

SAMPLE B: Tom bought four cartons of orange drink. There were about four glasses in each carton. About how many servings (one serving = one glass) could he get from the four cartons?

---

No further information is needed in Sample B, so nothing has been written in the blank under the problem.

NOTICE THAT YOU ARE NOT SUPPOSED TO WORK THE PROBLEMS; SIMPLY WRITE DOWN THE FACTS THAT ARE STILL NEEDED IN ORDER TO WORK THE PROBLEM. IF NO FACTS ARE NEEDED, LEAVE THE SPACE BLANK. ANY QUESTIONS?

1. It was the twentieth day of the month when Jack started to think of his birthday. He could hardly wait for it to arrive because he knew that one of his gifts would be a .22 rifle. He decided to figure out how many days there were until his birthday which was on the seventeenth of the following month. How many days were there?

---

2. When Terry was in sixth grade he weighed 79 pounds. He hoped to gain 30 pounds before the end of ninth grade so that he could weight as much as his older brother did. When Terry finished eighth grade, he found that he had gained weight. How much did he weigh at the end of the eighth grade?

---

3. Kathy got her parents' permission to have a party. She decided to invite 17 friends. That meant she had to write 17 invitations and buy 17 stamps. Kathy remembered that she now had to buy 4¢ instead of 3¢ stamps. If Kathy had 50¢ of her weekly allowance left, how much might she have to borrow from her mother?

---





4. Dave's father added \$150. to his bank account from his paycheck of \$180. The next day he withdrew \$69. How much money remained in his bank account?
- 
5. A tree outside Alan's window has grown so much during the past year that it is now 4 inches above his window sill. If the window sill is 19 feet above the ground, how many inches has the tree grown during the past year?
- 
6. Early in the baseball season the Giants had won 11 games and the Cubs had won 13. Which team was ahead of the other?
- 
7. Janet's mother decided to can some home-grown tomatoes. She wanted to know how many glass jars to buy, and what size jar would be best. She found that a pint jar would hold about half-dozen tomatoes. She estimated that she would get about 100 tomatoes from the family garden. About how many jars should Janet's mother consider buying?
- 
8. Rick wanted to paint his room. The clerk at the paint store told him to find out how much surface he would be painting. Rick made some measurements and found that the length of his room was 20 feet and the width was 15 feet. What was the area of the ceiling, four walls and the floor?
- 
9. Bill was having a Hallowe'en party for 15 friends. The refreshments included a large jug of cider. Bill noticed that after one hour  $\frac{3}{4}$  of the cider had been poured and drunk. Bill wondered how many pints were left?
- 
10. Joe didn't like to get up any earlier than was necessary. He found that if he ran to the bus stop (2 block away) at the last minute, and then ran to school when he got off the bus (one block), he could reach school in twelve minutes. How far was it from his home to his school?
-





11. Sue's family decided to drive to Hopetown to visit some friends. The distance from their home to Hopetown was 56 miles. The train travelled the distance in  $1\frac{1}{2}$  hours. However, the family decided to travel by car and leave at 7 a.m. What time will they arrive in Hopetown?
- 
12. Ann and Linda were comparing the sizes of their rooms. Ann found that the distance around her room was 80 feet. Linda knew that the width of her room was three times the length. What was the difference in the distance around the two rooms?
- 
13. An 8 ounce bottle of pop costs 14¢. The large size bottle costs 24¢. Joan wonders if she will save money if she buys the large size.
- 
14. Ronnie knew that sound travels at 1100 feet per second. He had heard in a science class that a person could estimate how far away a streak of lightning was by counting the seconds between the flash and the thunder. Every 5 seconds meant about a mile in distance. At 10:00 p.m. during a thunder storm Ronnie began to watch for flashes of lightning. Four seconds later he saw a flash. How far away was the thunder?
- 
15. Among boys of school age, accidents cause 4 out of every 10 deaths. Of the 14,000,000 boys enrolled in school, how many are killed each year by accidents?
- 
16. Mrs. Hamilton canned 45 quarts of applesauce to sell to neighbours. She used 2 bushels of cooking apples at \$2.45 a bushel. The jars cost \$2.40, and she used 60 cents worth of sugar and spices. Did she make a profit?
- 
17. Lois wants to send a parcel by parcel post. The clerk at the post office told her that the postage was \$.19 for each pound beyond the first pound. If the package weighs six pounds, how much money will Lois have to spend for postage?
-





18. A truckdriver carrying a load of lumber approached a bridge. He noticed a sign which said, "LIMIT - FIVE TONS". The driver knew that his load of lumber weighed three tons. Should he continue across the bridge?
- 

19. Bill left school at 3:30 P.M. It was necessary for him to be home at 4:00 P.M. He decided to take the bus which took 10 minutes to get him home. Would he make it home in time?
-

6. A preliminary survey of the area of the proposed project was conducted in 1961. The results of this survey are summarized in Table 1. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres.

7. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres. The area of the project is approximately 100 acres.

# SUMMARY OF RESULTS ON CRITICAL THINKING TESTS<sup>1</sup>

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	<u>TOTAL</u>	<u>MALES</u>	<u>FEMALES</u>
$\bar{X}$	39.242	40.067	38.374
Sx	9.271	9.086	9.384
N	351	180	171

---



---

(1) Each correct item scored 2 points. The mean and standard deviation must be halved if one wishes to consider the number correct as the total score.

## Reliability

Tate (1964) reports Kuder-Richardson reliabilities of .67 and .75 which the original test authors found for the "Missing Facts" test. In his study, Tate obtained split half coefficients of .56 and .60. He used fewer items than the authors of the test. "Missing Facts" is called the numerical part of the critical thinking test in the present study.

Tate used seven paragraphs of the Critical Thinking Test and obtained a split half reliability of .66 in a sample of thirty-three pairs and coefficients of .62 in samples of 76 and 43 girls. This test is the verbal part of the Critical Thinking Test in the present study (4 paragraphs are used) and is entitled the Rension Test (Reading Comprehension).

The present writer checked the internal consistency of the total Critical Thinking Test which he used and obtained a Kuder-Richardson coefficient of .60 for the 44 items. This coefficient was obtained for a random sample of 107 subjects from the total sample of 351.





## Appendix A: Study Questionnaire

A questionnaire was developed to assess the aesthetic interest of participants. The questionnaire was designed to be completed by participants who were not involved in the study. The questionnaire was designed to be completed by participants who were not involved in the study. The questionnaire was designed to be completed by participants who were not involved in the study.

1. I am interested in the aesthetic value of objects.

2. I am interested in the aesthetic value of objects.

3. I am interested in the aesthetic value of objects.

4. I am interested in the aesthetic value of objects.

### APPENDIX D

#### AESTHETIC INTEREST SCALE

5. I am interested in the aesthetic value of objects.

6. I am interested in the aesthetic value of objects.

7. I am interested in the aesthetic value of objects.

8. I am interested in the aesthetic value of objects.

9. I am interested in the aesthetic value of objects.

10. I am interested in the aesthetic value of objects.

11. I am interested in the aesthetic value of objects.











5. When you visit a cathedral are you more impressed by a sense of reverence and worship than by the design or appearance of the building? . . . . . a. YES b. NO
6. If you had the opportunity, and if nothing of the kind existed in the place where you lived, would you prefer to start:  
 a. a discussion or debating club  
 b. a classical orchestra . . . . . a. CLUB b. ORCHESTRA
7. If you had some time to spend in a waiting room and there were only two magazines to choose from, which would you choose? . . . . . a. AGE b. ARTS
8. Do you think that in our present day world of invention and discovery we are much better off than people of earlier societies such as the Greeks? . . . . . a. YES b. NO
9. Would you prefer to hear a series of talks on:  
 a. social service work in Alberta  
 b. modern day painters . . . . . a. WORK b. PAINTERS
10. In a paper, such as the Edmonton Journal, are you more likely to read:  
 a. world news  
 b. art and entertainment . . . . . a. NEWS b. ART

\*\*\*\*\*

IN THE NEXT QUESTIONS, MARK 1, 2, 3, 4 FOR YOUR FIRST, SECOND, THIRD AND FOURTH CHOICES. PUT THE NUMBER OF YOUR CHOICE IN THE SPACE ON THE LEFT.

11. In your opinion, can a business man best spend Sunday in:  
 \_\_\_\_\_ a. reading serious books  
 \_\_\_\_\_ b. trying to win at golf or racing  
 \_\_\_\_\_ c. going to a concert to hear an orchestra  
 \_\_\_\_\_ d. hearing a really good sermon
12. If you could change the courses taught in school, would you:  
 \_\_\_\_\_ a. add more courses in music and fine arts  
 \_\_\_\_\_ b. add more courses in social problems  
 \_\_\_\_\_ c. add more laboratory classes  
 \_\_\_\_\_ d. add more practical courses
13. Do you prefer a friend who is:  
 \_\_\_\_\_ a. efficient and works hard  
 \_\_\_\_\_ b. a serious thinker  
 \_\_\_\_\_ c. a leader and organizer  
 \_\_\_\_\_ d. artistic and sensitive





14. When you go to the movies, do you, as a rule, enjoy most:

- ☐ a. movies about great men
- ☐ b. movies on ballet and great music
- ☐ c. movies on love and human suffering
- ☐ d. movies that argue some point of view

15. If you had the time and money, would you like to:

- ☐ a. collect fine sculptures or paintings
- ☐ b. start a training school for retarded children
- ☐ c. enter politics
- ☐ d. start your own business

16. Which of the following would you prefer to do during part of your next summer vacation (if you had everything needed to do them):

- ☐ a. write an original book or article
- ☐ b. stay in a secluded spot where the scenery is beautiful
- ☐ c. enter a tennis or athletic tournament
- ☐ d. learn a foreign language





## SUMMARY OF RESULTS ON AESTHETIC INTEREST SCALE

---

	<u>TOTAL</u>	<u>MALES</u>	<u>FEMALES</u>
$\bar{X}$	24.581	21.956	27.345
Sx	5.838	4.968	5.394
N	351	180	171

---

Reliability

The test authors report a split-half reliability of .80 and retest reliability of .90 and .87. These coefficients were obtained for large samples of college students.

Using the total scale, the authors also found that females obtained a mean score which was about 7 points higher than males (43.86 vs. 36.72). This tendency is also true for the younger subjects who comprised the sample in the present study.



APPENDIX

DEVOUTNESS S

## APPENDIX E

### DEVOUTNESS SCALE





THE PERLEY RELICE  
INVENTORY

- A. I am (a) Protestant, (b) Catholic, (c) Jewish, (d) other .....
- B. If you are a Protestant, draw a circle around the name of the church to which you belong: Anglican, Baptist, Church of the Nazarene, Church of God, United, Lutheran, Presbyterian, Unitarian, Salvation Army, Society of Friends (Quakers), Seventh Day Adventist, Greek Orthodox, Mennonite, Jehovah's Witness, Reformed, Hutterite, Church of the Latter Day Saints, Pentecostal, Other \_\_\_\_\_

ANSWER THE NEXT FIVE QUESTIONS BY SELECTING THE MOST CORRECT  
RESPONSE FROM THE FOLLOWING FIVE CHOICES:

1. every day if possible
2. every two or three days
3. once a week
4. once a month
5. once a year
6. never

1. I go to church (1 2 3 4 5 6 ).
2. My mother goes to church (1 2 3 4 5 6).
3. My father goes to church (1 2 3 4 5 6).
4. Our family says prayers together at home (1 2 3 4 5 6).
5. I say prayers alone (1 2 3 4 5 6).





SUMMARY OF RESPONSES TO DEVOUTNESS SCALE<sup>1</sup>

---

	<u>HIGH</u>	<u>MODERATE</u>	<u>LOW</u>
1. I go to church	.0912	.8006	.1083
2. My mother goes to church	.0598	.6610	.2792
3. My father goes to church	.0513	.5271	.4216
4. Our family prays together	.2165	.0570	.7265
5. I say prayers alone	.8006	.0769	.1225

---

<sup>1</sup>Cells contain proportions of sample (N=351) who were in each classification. Raw data in Appendix H contain actual responses by item.

Reliability

A retest reliability coefficient was calculated for each item nine weeks after the first administration. Coefficients ranged from .74 to .86, with the average being .80. It appears that the responses to the items were quite consistent over both administrations. The retest involved 117 of the total group of 351 subjects.



...the ... ..  
... ..  
... ..  
... ..

- 1. ... ..
- 2. ... ..
- 3. ... ..
- 4. ... ..
- 5. ... ..
- 6. ... ..
- 7. ... ..
- 8. ... ..
- 9. ... ..
- 10. ... ..
- 11. ... ..
- 12. ... ..
- 13. ... ..
- 14. ... ..
- 15. ... ..
- 16. ... ..
- 17. ... ..
- 18. ... ..
- 19. ... ..
- 20. ... ..

APPENDIX F

SOCIOECONOMIC STATUS INVENTORY

- 21. ... ..
- 22. ... ..
- 23. ... ..
- 24. ... ..
- 25. ... ..
- 26. ... ..
- 27. ... ..
- 28. ... ..
- 29. ... ..
- 30. ... ..
- 31. ... ..
- 32. ... ..
- 33. ... ..
- 34. ... ..
- 35. ... ..
- 36. ... ..
- 37. ... ..
- 38. ... ..
- 39. ... ..
- 40. ... ..
- 41. ... ..
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- 44. ... ..
- 45. ... ..
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- 47. ... ..
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- 85. ... ..
- 86. ... ..
- 87. ... ..
- 88. ... ..
- 89. ... ..
- 90. ... ..
- 91. ... ..
- 92. ... ..
- 93. ... ..
- 94. ... ..
- 95. ... ..
- 96. ... ..
- 97. ... ..
- 98. ... ..
- 99. ... ..
- 100. ... ..





Directions: In the following questions, mark your answer by putting a circle in the right place. For example, in the question, "Does your family have a car?" draw a circle around "YES" if your family does have a car, and "NO" if it does not. Be sure to answer all the questions.

1. Does your family own a car? . . . . . YES NO
2. Does your family have a garage or carport? . . . . . YES NO
3. Did your father go to high school? . . . . . YES NO
4. Did your mother go to high school . . . . . YES NO
5. Did your father go to university? . . . . . YES NO
6. Did your mother go to university? . . . . . YES NO
7. Is there a writing desk in your home? . . . . . YES NO
8. Does your family have a Hi-Fi or record player? . . . . YES NO
9. Does your family have a piano? . . . . . YES NO
10. Does your family get a daily newspaper? . . . . . YES NO
11. Does your family get a religious newspaper? . . . . . YES NO
12. Do you have your own room at home? . . . . . YES NO
13. Is there an encyclopedia in your home? . . . . . YES NO
14. Does your family own its home? . . . . . YES NO
15. Does your family have more than 100 hard-cover books? . YES NO  
(4 shelves about 3 feet long)
16. Did your parents borrow any books from the library in  
the past year? . . . . . YES NO
17. Does your family leave town each year for a holiday? . YES NO
18. Do you belong to any club where you have to pay fees? . YES NO
19. Does your mother belong to any clubs or organizations  
such as study, church, art or social clubs? . . . . . YES NO
20. Does your father belong to any such clubs or organiza-  
tions? . . . . . YES NO
21. Have you ever had lessons in music, dancing, art,  
swimming, etc., out side of school? . . . . . YES NO
22. My father's occupation (job) is \_\_\_\_\_

It is the following question, and your answer is falling a little in the right place. The answer is the number "100". As you can see, the number "100" is the only number that has a zero, and it is the only number that has a zero.

1. Does your family own a car? ( )
2. Does your family own a house? ( )
3. Does your family own a dog? ( )
4. Does your family own a cat? ( )
5. Does your family own a television? ( )
6. Does your family own a refrigerator? ( )
7. Does your family own a washing machine? ( )
8. Does your family own a microwave oven? ( )
9. Does your family own a stereo system? ( )
10. Does your family own a car stereo? ( )
11. Does your family own a computer? ( )
12. Does your family own a printer? ( )
13. Does your family own a scanner? ( )
14. Does your family own a digital camera? ( )
15. Does your family own a video camera? ( )
16. Does your family own a DVD player? ( )
17. Does your family own a Blu-ray player? ( )
18. Does your family own a game console? ( )
19. Does your family own a smart TV? ( )
20. Does your family own a smart home system? ( )
21. Does your family own a smart lock? ( )
22. Does your family own a smart thermostat? ( )
23. Does your family own a smart light bulb? ( )
24. Does your family own a smart speaker? ( )
25. Does your family own a smart plug? ( )
26. Does your family own a smart doorbell? ( )
27. Does your family own a smart alarm system? ( )
28. Does your family own a smart security system? ( )
29. Does your family own a smart fire alarm? ( )
30. Does your family own a smart smoke detector? ( )
31. Does your family own a smart carbon monoxide detector? ( )
32. Does your family own a smart water leak detector? ( )
33. Does your family own a smart gas detector? ( )
34. Does your family own a smart air quality monitor? ( )
35. Does your family own a smart air purifier? ( )
36. Does your family own a smart humidifier? ( )
37. Does your family own a smart dehumidifier? ( )
38. Does your family own a smart air conditioner? ( )
39. Does your family own a smart heater? ( )
40. Does your family own a smart furnace? ( )
41. Does your family own a smart boiler? ( )
42. Does your family own a smart water heater? ( )
43. Does your family own a smart hot water heater? ( )
44. Does your family own a smart water softener? ( )
45. Does your family own a smart water filter? ( )
46. Does your family own a smart water meter? ( )
47. Does your family own a smart water valve? ( )
48. Does your family own a smart water shut-off valve? ( )
49. Does your family own a smart water leak shut-off valve? ( )
50. Does your family own a smart water leak shut-off valve? ( )



SUMMARY OF GROUP RESPONSES TO SES INVENTORY<sup>1</sup>

	<u>TOTAL</u>	<u>MALES</u>	<u>FEMALES</u>
$\bar{X}$	11.878	11.900	11.854
Sx	3.92	3.82	4.030
N	351	180	171

<sup>1</sup>These data include the response to item 22 which was scored 3, 2, or 1, depending on whether the father's occupation was professional, semi-skilled or non-skilled, respectively.

Reliability

Cropley (1963) and Elley (1961) used the same instrument with Edmonton students. They found that it correlated highly (.80 - .90) with other socioeconomic status measures and that it was easily administered.



APPENDIX F

- (a) ...
- (b) ...
- (c) ...
- (d) ...
- (e) ...
- (f) ...
- (g) ...
- (h) ...
- (i) ...
- (j) ...
- (k) ...
- (l) ...
- (m) ...
- (n) ...
- (o) ...
- (p) ...
- (q) ...
- (r) ...
- (s) ...
- (t) ...
- (u) ...
- (v) ...
- (w) ...
- (x) ...
- (y) ...
- (z) ...

APPENDIX G

CORRELATION AND FACTOR MATRICES

- (a) ...
- (b) ...
- (c) ...
- (d) ...
- (e) ...
- (f) ...
- (g) ...
- (h) ...
- (i) ...
- (j) ...
- (k) ...
- (l) ...
- (m) ...
- (n) ...
- (o) ...
- (p) ...
- (q) ...
- (r) ...
- (s) ...
- (t) ...
- (u) ...
- (v) ...
- (w) ...
- (x) ...
- (y) ...
- (z) ...





## VARIABLES

1. Sex (Females 1, Males 0).
2. Age (in months).
3. Number of children in family.
4. Father occupation (Professional 3, Skilled 2, Nonskilled 1).
5. Ethnicity (Bilingual 1, Monolingual 0).
6. Congruency of parent religion (Same 1, Mixed 0).
7. Socioeconomic status score (Gough).
8. Intelligence test score (CTMM).
9. Religious knowledge test score.
10. Dogmatism.
11. Critical Thinking (Reading Comprehension).
12. Critical Thinking (Missing Facts).
13. Critical Thinking (Total 11 + 12).
14. Need Achievement (T.A.T., McClelland).
15. Devoutness (Summary score; high score = high devoutness).
16. Religious Absolutism Index.
17. Aesthetic Interest Score.
18. Devoutness (Frequency of personal church attendance, low score = high devout).
19. Devoutness (Frequency of maternal church attendance, low score = high devout).
20. Devoutness (Frequency of paternal church attendance, low score = high devout).
21. Devoutness (Frequency of family prayer; low score = high devout).
22. Devoutness (Frequency of individual prayer; low score = high devout).





INTERCORRELATIONS: TOTAL GROUP (N=351)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	21	22
1	--																					
2	-062	--																				
3	-012	117	--																			
4	029-226	-031	--																			
5	008	162-135	-168	--																		
6	001-030	000-043	226	--																		
7	-006-361	-127	586-097	104	--																	
8	-192-595	-088	258-064	053	343	--																
9	144-207	-146	181-066	-028	196	355	--															
10	069	062	096-113	048	038-120	-040-098	--															
11	003-168	-086	107	002	012	166	283	313-087	--													
12	-159-306	-102	171	004	047	264	462	372-149	318	--												
13	-091-288	-114	169	004	035	261	456	419-143	834	788	--											
14	021-134	-061	169-020	003	093	197	152-029	186	234	257	--											
15	111-180	023	070-006	331	350	016-011-022	138	069	130-054	--												
16	071-001	020-070	106	043-092	-077-068	237-054-122-105	008	149	--													
17	461	052	007-032	074	024-087	-224-028	103-065-142-125-041	001	071	--												
18	-008	076	009-040	020-091	-128	038	051	083-027-040-041	069-497	021	035	--										
19	-073	077-013	-039-034	-237-277	039	058	077-018-041-036	059-689-047-010	422	--												
20	017	102	033	031-062	-470-220-012	035	033-052-044-059	091-691-089-009	357	570	--											
21	-033	100-096	-033	053-146	-218	029	002	011-101	000-066	062-728-101	011	238	385	320	--							
22	-214	184	066-112	055-187	-238-086	001-021-117-062-112-049-589-123-056	169	183	246	213	--											



UNROTATED PRINCIPAL AXIS FACTOR MATRIX

COMMUNALITIES	FACTORS							
	1	2	3	4	5	6	7	8
1	0.765	-0.007	-0.792	0.012	-0.276	0.069	0.055	0.121
2	0.735	-0.537	0.166	0.255	-0.310	-0.027	-0.393	-0.226
3	0.833	-0.148	0.091	-0.137	0.012	-0.587	-0.437	0.475
4	0.773	0.392	-0.185	-0.560	0.048	0.181	-0.413	-0.133
5	0.617	-0.074	0.028	0.584	0.154	0.448	-0.158	-0.089
6	0.720	0.286	0.082	0.336	0.289	0.334	-0.272	0.354
7	0.718	0.641	-0.072	-0.439	0.090	0.240	-0.199	-0.049
8	0.784	0.537	0.057	-0.089	0.385	0.022	0.196	0.235
9	0.460	0.383	-0.244	0.103	-0.157	0.025	0.131	0.136
10	0.541	-0.190	-0.282	0.163	0.526	-0.301	-0.022	0.104
11	0.734	0.520	-0.076	0.408	-0.253	-0.283	-0.072	-0.121
12	0.645	0.578	0.115	0.231	-0.032	-0.023	-0.017	0.106
13	0.951	0.674	0.018	0.400	-0.181	-0.198	-0.057	-0.016
14	0.514	0.217	-0.186	0.053	0.119	-0.005	-0.456	-0.315
15	0.956	0.682	-0.002	0.006	-0.026	-0.137	0.033	-0.085
16	0.638	-0.038	-0.259	0.204	0.504	-0.251	0.075	-0.376
17	0.677	-0.148	-0.682	0.121	-0.219	0.121	-0.053	0.257
18	0.456	-0.363	-0.193	0.072	0.256	0.005	-0.173	0.088
19	0.623	-0.484	-0.137	0.019	0.143	-0.069	0.033	-0.029
20	0.697	-0.501	-0.170	-0.149	-0.060	-0.158	0.011	-0.161
21	0.561	-0.438	-0.040	0.056	0.074	0.341	0.017	0.081
22	0.477	0.443	0.324	0.038	-0.122	0.070	-0.097	0.220
	14.877	4.032	1.697	1.560	1.264	1.213	0.980	0.958
Per cent Total Variance	18.2%	14.7%	7.4%	7.1%	5.7%	5.5%	4.6%	4.5%
Per cent Common Variance	27.1%	21.8%	10.9%	10.5%	8.5%	8.2%	6.6%	6.4%





FACTOR LOADINGS AFTER VARIMAX ROTATION

COMMUNALITIES	FACTORS							
	1	2	3	4	5	6	7	8
1	0.765	-0.073	0.014	0.038	0.863	-0.078	0.068	-0.058
2	0.735	-0.148	-0.813	-0.127	-0.031	0.089	-0.060	0.086
3	0.833	-0.063	-0.109	-0.028	-0.012	-0.057	0.029	0.901
4	0.773	-0.029	0.181	0.842	0.029	-0.106	-0.132	0.026
5	0.617	0.090	-0.249	-0.099	0.011	0.655	0.110	-0.305
6	0.720	-0.271	0.110	0.029	0.030	0.785	0.026	0.127
7	0.718	-0.318	0.362	0.673	-0.025	0.033	-0.146	-0.070
8	0.784	0.084	0.752	0.169	-0.228	0.067	0.020	-0.007
9	0.460	0.087	0.326	0.069	0.217	-0.059	-0.140	-0.101
10	0.541	0.126	0.103	-0.125	0.112	0.118	0.622	0.262
11	0.734	-0.110	-0.030	0.032	0.013	-0.061	0.030	-0.012
12	0.645	-0.004	0.315	0.111	-0.169	0.119	-0.146	-0.020
13	0.951	-0.073	0.165	0.085	-0.091	0.030	-0.065	-0.018
14	0.514	0.173	-0.139	0.538	-0.038	0.060	0.203	-0.031
15	0.956	-0.950	0.063	0.085	0.056	0.091	0.156	0.019
16	0.638	-0.100	-0.058	-0.027	-0.007	0.009	0.779	-0.113
17	0.677	0.039	-0.080	-0.045	0.804	0.111	0.029	0.053
18	0.456	0.633	0.022	0.071	0.055	0.071	0.171	0.112
19	0.623	0.755	0.014	-0.054	-0.018	-0.186	0.115	-0.011
20	0.697	0.702	-0.109	0.037	0.022	-0.434	0.032	-0.016
21	0.561	0.696	0.038	-0.034	0.015	0.113	-0.152	-0.179
22	0.477	0.480	-0.140	-0.194	-0.208	0.050	-0.336	0.160
$s^2$	14.877	$s^2_j=3.375$	1.787	1.608	1.594	1.382	1.346	1.104





## APPENDIX H

### RAW DATA



## VARIABLES

1. Identification Number
2. Sex
3. Father Occupation
4. Ethnicity
5. Socioeconomic Status
6. Intelligence
7. Dogmatism
8. Critical Thinking
9. Need Achievement
10. Aesthetic Interest
11. Devoutness





1	2	3	4	5	6	7	8	9	10	11
334	0	1	0	07	090	105	34	02	27	16462
008	1	2	1	10	106	092	40	02	31	34451
011	1	2	0	13	104	100	40	17	33	33562
015	1	1	1	06	111	128	46	19	30	34451
083	1	3	0	18	119	094	38	13	29	33531
085	1	2	0	14	119	117	48	09	27	33521
086	1	2	0	08	092	086	50	12	42	33562
091	1	2	1	10	109	112	38	05	24	33561
101	1	1	1	04	103	080	36	19	26	33546
097	1	2	0	13	092	118	32	00	29	33563
109	1	1	1	10	101	128	44	02	26	33561
121	1	1	1	06	081	095	32	00	22	33511
198	1	1	1	12	100	103	48	03	30	34461
217	1	2	0	11	094	122	30	04	24	33551
231	1	2	1	15	097	119	32	04	28	33551
270	1	3	0	13	099	110	44	13	30	35311
347	1	3	1	18	105	111	38	03	26	34462
003	0	1	1	08	109	108	42	16	27	34421
009	0	2	0	14	101	097	26	05	14	33531
013	0	3	0	20	116	103	38	09	15	33553
014	0	3	1	15	102	082	38	03	23	35351
018	0	1	0	08	124	083	44	18	26	35361
049	0	1	0	11	116	102	38	02	25	34454
052	0	2	0	09	088	105	42	22	22	34462
059	0	2	0	09	099	082	33	24	23	33551
076	0	1	0	09	104	121	40	20	29	35341
111	0	1	1	13	095	105	32	02	27	34452
122	0	2	1	16	090	104	39	16	18	34461
144	0	3	0	14	112	122	40	14	26	34462
284	0	3	0	20	112	099	40	14	13	33551
293	0	2	1	10	124	073	50	12	25	33461
294	0	3	0	19	098	085	44	08	20	33562
330	0	1	0	13	116	109	26	06	23	35355
346	0	2	0	17	103	091	44	07	18	34441
040	1	2	1	05	093	110	44	05	30	45316
058	1	2	0	17	103	103	42	20	33	44411
240	1	1	0	07	093	116	38	16	32	44461
026	0	1	1	06	093	112	40	03	18	44453
053	0	2	0	11	088	121	28	10	24	44464
242	0	2	1	12	129	102	40	15	23	44462
029	1	3	0	15	106	085	36	05	25	33651
062	1	1	0	14	088	093	44	17	28	33641
090	1	1	1	05	094	127	40	06	30	33661
096	1	1	1	09	098	089	26	09	33	33642
098	1	1	1	07	103	075	26	08	15	33656

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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